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Geological Mine-Maps and Sections.*

BY D. W. BRUNTON.†

The maps of our large mines are usually prepared with the greatest care; but it is somewhat singular that, in comparison with the great amount of time and money spent in surveying and platting, so little actual use is made of them. Almost the only purpose for which a completed survey-map is afterward consulted, is the determination of the relative position of the different workings to each other, and to the boundary lines of the property.

After the completion of such a map, it should be made the beginning of another, and in most cases a far more important, undertaking, namely, its utilization as a starting point for a complete inventory of the company's underground possessions. The ordinary mine-survey map, being nothing but a record of what has been done, is, in one sense, only ancient history. To increase its value, such additions should be made as will render it a complete statement of the amount and value of ore in sight at any particular time, and a guide for future developments. Comparatively little extra labor is involved in this undertaking, since the larger and more expensive part of the work has already been completed when the mine has been surveyed and mapped. The necessary additions consist in working out, and platting on the maps, the geology of the mine as exposed in the workings, in such a manner that the geological survey may be of daily use in the development and operation of the mine.

The first step toward the production of a geological map consists in tracing individual level-sheets from the general or composite map. The area to be included, outside of the property in question, will depend very much on local conditions; but, for geological, legal and commercial reasons, it should be extended as far as reasonably practicable. The scale to be adopted likewise depends on local conditions and individual preference; but experience has shown 40 ft. to the inch to be a very convenient scale. Where the area to be included would necessitate a map of more than 30 in. wide by 36 in. long, it is better to divide it into different sections, the maps of which can then often be made somewhat smaller, say, 24 by 30 in., which is a very convenient size.

The individual level-sheets should be very carefully made, so as to register perfectly, and should be perforated (preferably on the left-hand side) to pass over three pairs of arch-files, secured to the left-hand side of a very thin paneled frame about 1 in. larger, all round, than the maps, somewhat after the manner of an arch-file bill-holder. The vertical stems on the front of the files hold the individual level-sheets in position so that they will register perfectly with each other, and the swinging hooks at the top will permit the removal of any sheet for additions or corrections.

To keep the sheets from curling, a heavy paste-board cover should be fitted over the top; and, instead of perforating it for the front uprights, it will be found better to cut longitudinal slots to take both front and back uprights, so that the cover can be readily lifted off whenever the sheets are to be used.

Where a district of considerable area has to be covered and a large number of section books are required, they are most conveniently kept in a horizontal position in a case provded wth runners, the same as drawers, and, in order to economize space, special arches 1.5 in. lower than the regular pattern can be readily obtained from the factory.

After the individual sheet-maps are traced, the next step is to transfer them by means of carbon paper into pocket note books. Any size may be adopted for this work; but in practice it is found that a large book (say 8 by 10 in.), permitting comparisons over a considerable area, is most convenient. In some cases, where the geology is reasonably simple, a convenient plan is to take very light-colored blueprints of the individual level-sheets directly into the mine. These can be folded up into a convenient size for carrying in the pocket, and, unless the geology is extraordinarily complicated, will answer every purpose. In taking the geology of different levels, the greatest care must be taken to record the facts exactly as they occur in the ground, without bias for or against any previously adopted theory. In old workings the openings must be examined with the greatest care, in order to determine exactly the boundaries of the orebody, and the strike and dip of the spurs and intersecting veins, as well as of all faults, slips, water-courses, ets.

After the geological records have been thus brought up to date, the geology of new workings is very much more easily determined. In fact, it will usually be found that the foremen, shaft-bosses, and even the common miners, will take such an interest in the work that every change of rock or ore value, and every slip or fault, will be pointed out to the geologist by the men, instead of his having to hunt for them, as he has had to do in the older workings.

It has always been found that, when the work is recorded in exact keeping with observed facts, the theories will take care of themselves, and little or no difficulty will be experienced in interpreting the facts when vertical sections are made from the horizontal sheets. These are to be platted directly from the horizontal level-sheets, and, if the work has been carefully and correctly done, the result will be a set of vertical geological sections of the greatest value, not only in checking up the work on the horizontal sections, but also in furnishing the best possible basis for measuring the rate of development and ore extraction, as well as in determining at any time the amount and value of ore in sight.

Both horizontal and vertical sections may be used for the recording of samples, the better plan being to encumber the map only with the number of the sample; the description of the ore, the width sampled, etc., together with the assays, being entered in a separate note book.

I would here say, that, in my judgment, every company operating large mines would find it advantageous to employ, as a separate official, a competent mining geologist, whose duty it should be to follow continuously all workings and surveys, and note with precision those indications which hard-worked superintendents, foremen and surveyors, however intelligent, might easily overlook or fail to record. The proper person for this most important work is a man who has nothing else to do, and who will do this one thing with industry, enthusiasm and technical knowledge.

[Mr. Brunton's paper was accompanied by illustrations which it is impossble for us to reproduce satisfactorily. They show tracings of successive levels, 40 ft. vertically apart, and also tracings of vertical sections. Each of the level-sheets is traced directly from the ordinary survey-map, after which the geology, as exposed in the openings and determined by careful examination, is platted on the map, care being taken to note the strike and dip of all faults, spurs and intersecting veins. Tracing cloth is always used for these maps, both for speed and convenience in tracing from the working survey-map, and for the further reason that, when the level-sheets are in the holder, at least three sets of levels can always be seen through the translucent cloth, thereby affording an opportunity to determine the dip and trend of the ore-shoots, and consequently to project new workings with much greater ease than if observations were limited to a single sheet. The vertical sections, taken directly from the horizontal level-sheets, afford a very convenient means of studying the vein-structure and at the same time of keeping a record of the ground stoped during each calendar month. In addition to these advantages, the vertical sections afford an almost perfect check on the geology, which is nearly always noted first on the horizontal levels. Any errors, either in observation or interpretation, that may have crept into the geologist's work are sure to be detected when the vertical sections are platted.]

*Abstract of a paper read at the British Columbia meeting, July, 1905, of the Am. Inst. Min. Eng.: from advance proof, and subject to revision by the author.

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Cornish Mine Statistics.

SPECIAL CORRESPONDENCE.

The number of miners employed in this classic ground of the profession, during the year 1904, shows an increase of 79 (68 of whom were employed underground and 11 at surface).

PERSONS EMPLOYED—MINES.

Year.	Below Ground.	Above Ground.	Total.	% Above Ground.
1902.....	3,473	2,793	6,266	0.83
1003.....	3,440	2,706	6,146	0.78
1904.....	3,508	2,717	6,225	0.77

The large number of laborers employed at the surface, compared to the miners, points to the necessity of still further use of labor-saving dressing machinery. The decreasing percentage of laborers is welcome.

TOTAL ACCIDENT RATE PER 1,000.

Year.	No. Accidents.	Below Ground.	No. Accidents Above Ground.	Total.
1902	4	1.15	..	0.63
1903	5	1.45	..	0.81
1904	6	1.71	2	1.28

PERSONS EMPLOYED—QUARRIES.

Year.	Inside.	Outside.	Total.	% Outside.
1902.....	3,918	1,971	5 889	0.50
1903.....	3,768	1,944	5,712	0.51
1904.....	3,905	1,909	5,814	0.48

TOTAL ACCIDENTS PER 1,000 EMPLOYED.

Year.	No. Accidents.	Rate.
1902.....	2	0.34
1903.....	2	0.35
1904.....	5	0.86

It is painful to see this increasing rate during the three years, yet Mr. Martin (H. M. Inspector of mines for the southern district of England), to whose report I am indebted for the data, makes no comment on it. Unfortunately, the increase is not confined to Cornwall. All the mines under the Metalliferous Mines Act show an increase in 1904 over 1903, from 1.20 to 1.60 below ground, and from 0.33 to 0.57 above ground, respectively; in both sections from 0.84 to 1.19 per 1,000. The persons employed decreased from 29,823 to 29,504.

OUTPUT OF MINES (IN TONS).

Year.	Arsenic.	Arsenical Pyrites.	Copper Ore.	Ocher.	Dressed Tin.	Undressed Tin.	Uranium.	Wolfram.	Total.
1902	1,029	535	4,547	170	6,659	2,763	52	91	15,804
1903	690	...	5,351	23	6.463	661	6	269	13,540
1904	827	43	4,433	...	5,986	646	..	156	12,126

OUTPUT OF QUARRIES (IN TONS).

Year.	Chert and Flint.	China Clay and Stone.	Clay.	Igneous Rocks and Granite.	Limestone.	Slate.	Total.
1902	338	543,343	48,007	233,273	11,502	32,726	889,536
1903	443	544,561	36,068	227,741	14,436	25,730	870,845
1904	3,615	582,445	38,616	242,936	16,327	20,758	924,489

The decrease in the quantity of tin sold each year is regrettable, as the price of tin is remarkably high, the lowest price for the year being £116 and the highest £136. The imports of tin from foreign countries into the United Kingdom increased from 7,101 tons in 1900, to 14,804 tons in 1904; tin imports from British possessions increased from 228 to 682 tons; imports of tin in blocks, ingots, bars and slabs increased from 33,118 to 39,303 tons.

Again, it is disappointing to see the tonnage of wolfram drop from 269 to 156 tons. The demand for wolfram is increasing in England, about 1,000 tons being consumed a year, chiefly in the manufacture of high-speed tools.

Prospecting for wolfram and tin is now being conducted by two syndicates in the Launceston district on a one-twentieth royalty. The table given herewith shows the output per man in tons per annum:

Year.	Miners.	Quarrymen.
1902.....	4.55	227
1903.....	3.90	231
1904.....	3.45	234

The output from the mines seems to be very low, only about 4 tons per man; yet it must be taken into consideration, that every ton of mineral sold represents the breaking and hoisting of 40 additional tons, a total of about 500,000 tons (or an average of about 140 tons per miner). The Dolcoath mines crush approximately 100,000 tons a year, to produce less than 1,700 tons of dressed tin, or about 60 tons of ore to 1 ton of tin sold. This tonnage does not include any for waste in shaft-sinking or cross-cutting. The output, after all, is only apparently low. It is impossible to generalize either in tonnage, cost, wages or percentage saved, without taking into account a thousand and one factors, which so many mining engineers formerly ignored. Take the Atlantic, among the Lake Superior copper mines, or the Ivanhoe, among the Westralian mines; the costs are low, compared to the costs of the immediate neighbors of these mines; yet few of the writers have mentioned the fact, that by the sinking of the shaft, four large veins (productive, or nearly so, from end to end of claim) are opened up, and that the ore can be more cheaply extracted.

The output from the quarries may be considered good. In the slate quarries (the principal of which is Delabole, worked uninterruptedly for 500 years) about 13 tons of waste have to be broken and hoisted for 1 ton of slate produced; in the granite quarries, fully 12 tons of rock and overburden for 1 ton of finished stone; and in the china-clay and stone pits and quarries (including the surface and boulders), over 15 tons to 1 ton of clay. This makes a total of over 13,000,000 tons (equal to 223 tons a year for each man, or about 7½ tons a day). Even this quantity is low, compared with the mines of the Minnesota iron district. In the Cornish quarries everything is done by manual labor, save the hoisting. One of the large granite quarries attempted to use steam machinery in the dressing, but discarded it after a trial.

Oil and Gas of Independence Quadrangle, Kansas.

The oil and gas of the Independence quadrangle, Kansas, are described by Messrs. Frank C. Schrader and Erasmus Haworth in Bulletin 260 of the United States Geological Survey.

The Independence quadrangle is located in southeastern Kansas, and includes an important part of the Kansas-Indian Territory oil and gas field. This field has an area of nearly 11,000 square miles and extends from Paola, in eastern Kansas, southwestward about 200 miles to Muscogee, I. T., and Cleveland, Okla. The Independence quadrangle lies near the middle of this belt. Its principal towns are Independence, Coffeyville, Cherryvale, Neodesha, Caney and Elk City.

The first gas field recognized within the quadrangle trends north and south, and Coffeyville lies over its center. At present the most productive areas for both oil and gas—which are usually intimately associated—are the Bolton, Wayside, Caney, Tyro, Coffeyville, Independence, Dearing, Drum Creek, Cherryvale, Salt Creek and Neodesha.

Though small bodies of oil and gas are frequently found at depths of a few hundred feet below the surface, the larger bodies occur at greater depth in and near the Cherokee formation. The best wells, yielding oil of 32° B. gravity, strike oil in the middle, or 600-ft. sand. In the Independence region the productive zone ranges from 450 to 600 ft.; at Cherryvale, from 700 to 800; at Neodesha, from 800 to 900; at Bolton and Caney, from 1,100 to 1,200. At Wayside, midway between Bolton and Caney, two oil sands occur at the depths of 700 to 800 and 1,350 to 1,450 ft. The productive sands seem to be uniformly fine-grained.

There is a small independent refinery at Humboldt, which, with the others that are being built at Paola, Erie, Cherryvale, Niotaze and elsewhere, and are expected to be in operation by September, 1905, will make six independent refineries in all. Since about 1896, however, operations in the Kansas field have been largely in the hands of the Prairie Oil & Gas Company, the Kansas branch of the Standard Oil Company.

Like all Kansas oils, the oil of the Independence quadrangle has an asphaltum base. It is dark brown or black in color, and heavy, but varies greatly in specific gravity from place to place. The Standard Oil Company buys its oil on gravity tests.

The oil concentration processes are adaptable to many complex ores which cannot be handled by other means. The work already done leaves no doubt as to the utility of this new metallurgical method; it will stimulate inventors to undertake experiments with a view to the introduction of further modifications and improvements.

Cyaniding Silver-Gold Ore, Palmarejo—II.*

(*Continued from page 299, Aug. 19, 1905.*)

BY T. H. OXNAM.†

Precipitation of Silver and Gold.—There are six zinc boxes, five for the weak and one for the strong solution. The five weak-solution boxes are constructed of No. 10 sheet-steel, and are 2 ft. wide and 18 ft. long over all. Each box contains eight compartments, each compartment having an available zinc-capacity of 24 by 24 by 18 in., equivalent to 6 cu. ft. Six compartments only are filled with zinc shavings; therefore each box, when freshly dressed, contains 36 cu. ft. of zinc shavings, making a total of 180 cu. ft. of zinc shavings in the five weak-solution boxes.

The strong-solution zinc-box consists of seven individual round boxes or compartments, placed in series, each compartment being 28 in. in diameter and 24 in. in depth, and having an available zinc capacity of 5 cu. ft. Only six of the compartments are filled with shavings, the last compartment being reserved for the addition of the quantity of cyanide required to bring up the strong solution to standard strength. The strong-solution zinc-box has, therefore, a total of 30 cu. ft. of zinc shavings.

Records are kept of the quantities of weak and strong solution daily passing through the boxes, together with their assay values before and after precipitation. These records for the year (1904) show that 91,793 tons of weak, and 22,251 tons of strong, solution passed through the boxes; this is equivalent to an average of 251 tons of weak, and 61 tons of strong, solution every 24 hours. During this period the flow of solution through the boxes was interrupted on various occasions for a short time, due to the ordinary clean-ups, dressing of the boxes and unavoidable delays. Without taking such stoppages into account, the average rate of flow through the boxes equaled 1.4 tons of weak solution per 24 hr. per cu. ft. of shavings, and 2.03 tons of strong solution per 24 hr. per cu. ft. of shavings.

The actual rate of flow exceeds these figures, as it is assumed that the boxes were at all times kept dressed with the maximum amount of shavings, which was seldom the case.

The shavings are cut on an ordinary zinc lathe, from No. 9 sheet zinc; the size of the sheets being 18 by 84 in. Ordinarily, six sheets are wound on the mandrel of the lathe for one cutting. One boy, working 12 hr., cuts sufficient shavings to supply both the leaching and agitation plants, which together require an average of 120 lb. per 24 hours. It is found best to keep only a few days' shavings on hand; freshly-cut shavings give better results than those which have been cut for some time. The customary practice of moving the zinc from the lower to the upper compartments, when dressing the boxes, is not followed, fresh zinc being added as required to the top of each compartment.

The strength of the solution running through the weak boxes will average between 0.25 and 0.30% of KCN; while that of the solution going to the strong zinc box will average between 0.35 and 0.45% of KCN.

The average assay values per ton of the solutions entering the zinc boxes are approximately as follows:

Weak solution, $1 of gold and 2.25 oz. of silver; strong solution, $1.24 of gold and 3.5 oz. of silver.

It is seldom that any trouble is experienced with the precipitation of the contained values. As a rule, the precipitation of the gold is practically perfect; that of the silver averages 95%. When precipitation falls off, it is usually due to the presence of an accumulated excess of lime in the solution.

Clean-up of zinc boxes.—On account of structural difficulties, it is necessary to handle the precipitates more than is desirable. The boxes are cleaned twice a month. Before commencing on any box, clear water is passed through it a sufficient length of time to displace most of the cyanide solution; this requires 10 or

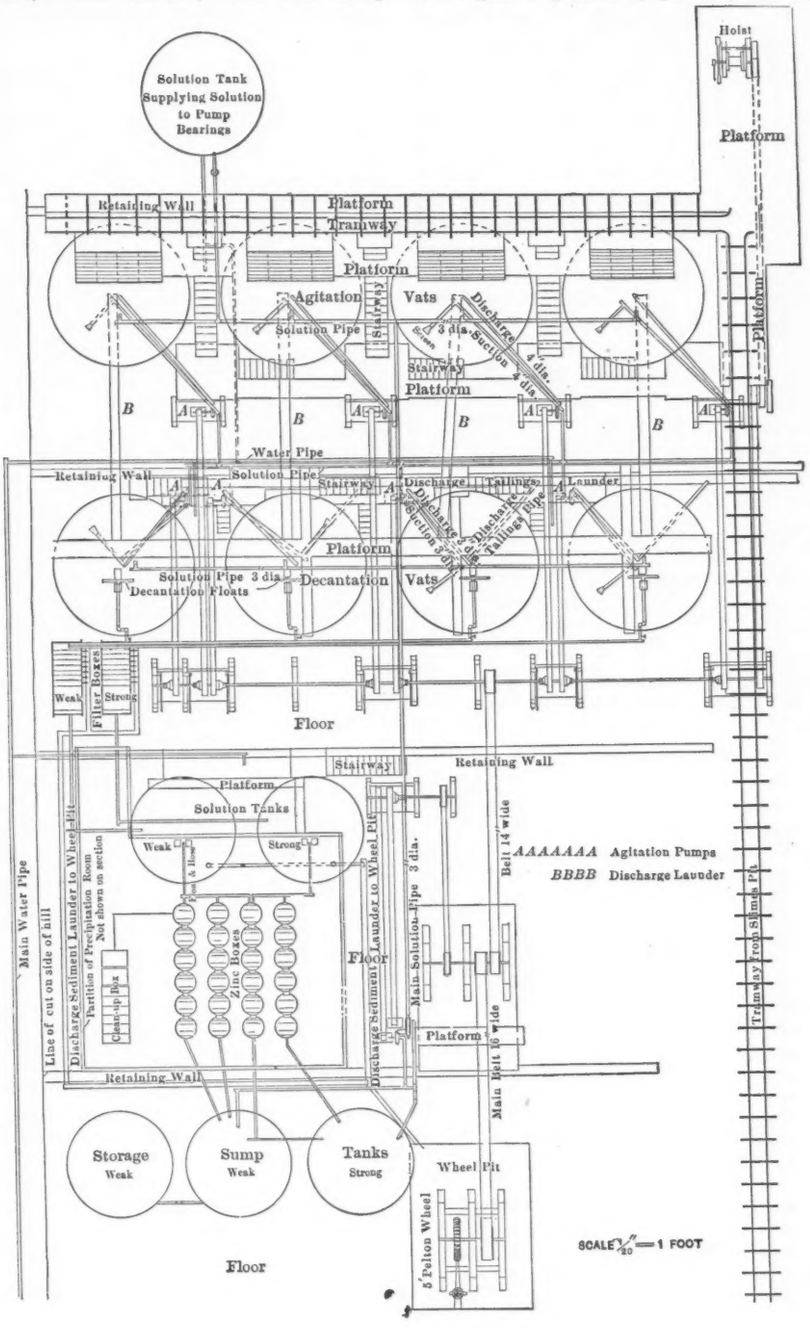

FIG. 3. PLAN OF CYANIDE PLANT.

*Abstract of paper read at Washington meeting, May, 1905, Am. Inst. Min. Eng.

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15 minutes. The shavings in the first compartment are thoroughly washed, after which they are removed and the water bailed out into the next compartment. The precipitates are now conveyed by buckets to the clean-up box, where they are passed through a 20-mesh screen. A small percentage of "short" zinc passes through this screen, but the greater part of such product is here separated from the finer precipitate and is returned to the boxes. The first compartment is now filled with water; the zinc contained in the other compartments is gradually transferred to it and thoroughly washed, the precipitates from each compartment being carried to the clean-up box as before mentioned. To minimize the oxidizing effect resulting from exposure of the wet zinc to the atmosphere, the washed shavings are at once placed in the highest vacant compartment of the zinc box and covered with solution.

The precipitate accumulating in the first compartment from the washing of the shavings, after settling for a short time, are also removed to the clean-up box. This latter is provided with three smaller settling-boxes, placed in series, which take the overflow from it. The bottom of the clean-up box is tapped by a 4-in. drop-pipe, which discharges directly into two large drying-pans beneath.

The product is now dried as much as is practicable, and then mixed, carefully sampled, assayed and sold on the premises to one of the large ore-buying companies. The moisture in the dried precipitate has averaged 0.27% during the past year.

The clean-ups are bulky, the net dry-weight of precipitate in each clean-up averaged between 1,100 and 1,200 lb. av. during the past year.

Considering the fact that the precipitates receive no treatment whatever beyond being passed through a 20-mesh screen, and the simple drying, as above mentioned, it is rather surprising that they carry such a high percentage of fine metal. During 1904 the assay-returns on which the sale of the precipitates is based have averaged slightly over 20,000 oz. silver, and approximately $8,000 of gold, per short ton. By actual weight, therefore, the percentage of fine metal contained in the dried product recovered throughout this period was approximately 68.57% of silver and 1.33% of gold, making a total of 69.90% of both metals.

Two clean-ups during 1904, of a combined net weight slightly exceeding 2,300 lb., gave an average assay value of 22,200 oz. of silver per ton, making the fine-silver content equal to 76.12% by weight of the precipitates.

A record of the labor employed in clean-ups shows that four men (one American and three native helpers) would readily remove 1,200 lb. (net dry-weight) of precipitate from the boxes, and have the product in the drying-pans in 8 hours. Based on the average assays of the precipitate for the year, this means that in 32 man-hours, approximately 12,200 oz. of fine metal would be handled, being equivalent to a duty of 371 oz. per man-hour. This rather high duty is of course due entirely to the fact that the precipitate contains high percentages of precious metals.

Tonnage and Extraction.—During 1904, 34,900 tons of sand were treated in the leaching-plant. This tonnage would have been considerably greater had it not been that during this period, aside from the stoppages due to general repairs, the mill was closed down for intervals aggregating 57 days for the entire 50 stamps.

The extraction for 1904 (as indicated by the assay differences between the sand charged into the leaching-vats and that being discharged) was 95.5% of the gold, and 52.5% of the silver value. The combined total during the year checks closely with that called for by the sand assays. The assay value of the sand treated during this period averaged $2.85 of gold, and slightly more than 16 oz. of silver per ton. During 1904, the returns from the precipitates were practically 1% less in gold and 0.5% more in silver than those called for by the precipitation records.

Consumption of Cyanide, Zinc and Lime.—The office records show that for 1904 the consumption per ton of sand cyanided was as follows: cyanide, 2.95 lb.; zinc, 0.96 lb.; and lime, 4.33 lb. Expressed in terms of potassium cyanide, this consumption would equal 3.69 lb. of potassium cyanide per ton of ore treated.

General Remarks.—The total quantity of solution passing through the zinc boxes during 1904, divided by the quantity of sand for the same period, shows that, for each ton treated, 3.27 ton of solution left the leaching vats, of which 2.63 ton was weak, and 0.64 ton strong solution. It is found that a large quantity of weaker solution gives more satisfactory results than a small quantity of the strong, and it is always made an important point to pass as much weak solution through a charge as possible. Experience has demonstrated that, in a given length of treatment, a rapid leaching rate and a large quantity of solution are more efficient than a slower leaching rate and a consequently lesser quantity of solution. The solution pipe lines and launders occasionally become quite choked in places with scale deposited from the solution. This scale, taken from lines carrying precipitated solution, contained from a trace to $1 of gold; and from 1 to 7 or 8 oz. of silver per ton. The scale deposited from the unprecipitated solution usually runs higher, several assays taken having averaged about $5 of gold and 18 oz. of silver per ton.

Ordinarily the solutions do not become excessively fouled. They contain small quantities of iron and manganese in addition to the zinc compounds present. Alkaline sulphides are very rarely or never noticed in solution; however, sulphocyanates and ferrocyanides appear to be constantly present in fair quantities, about 0.41% of ferrocyanide and 0.048% of sulphocyanate.

The sand charged averaged about 0.09% of latent acidity; and, as a rule, it contained no free acid.

The concentrate produced is sold to the same company that buys the cyanide precipitate. An attempt had been made to treat the concentrate by cyanide, but without success. Experiments on both raw and dead-roasted concentrate (reduced to various degrees of fineness) by leaching and agitation, for varying periods of time up to 34 days, and using solutions varying from 0.2 to 2% of KCN, proved unsatisfactory.

Table I., given herewith, shows the working costs for milling and cyaniding during 1904. The cost of all supplies is increased by the heavy freight transportation expenses, as well as by the duties placed by the Mexican government on most of the supplies used.

TABLE I—WORKING COSTS PER TON.

Milling:	
Supplies	$0.640
Labor	0.357
Lubricating	0.023
Assay office (labor and supplies)	0.935
Concentrating	0.092
Power (ditch maintenance and supplies)	0.234
Salaries	0.264
Miscellaneous (lighting, etc.)	0.018
Management and general expenses	0.336
Total[1]	$1.999

[1] $1.999 Mexican currency during this period was equivalent to $0.95 gold.

Cyaniding:	
Cyanide (2.95 lb. @ $0.63)	$1.859
Zinc (0.96 lb. @ $0.30)	0.288
Lime (4.33 lb. @ $0.0118)	0.051
Other supplies	0.050
Labor	0.329
Salaries	0.371
Assay office (labor and supplies)	0.036
Power (ditch maintenance and supplies)	0 017
Miscellaneous (lighting, etc.)	0·004
Management and general expenses	0.186
Total[2]	$3.191

[2] $3.191 Mexican currency during this period was eqivalent to $1.52 gold.

The cost of realization on cyanide precipitate has not been included in the cyanide working costs given herewith. Transportation expenses on the precipitates are also very heavy. In addition to these comes the heavy item of government bullion taxes. The average cost of realization on cyanide precipitate, per ton of ore cyanided, is as follows: Government taxes, $0.84; treatment charges (including transportation expenses), $1.06; total, $1.90. The cost of realization on the concentrate produced is also unusually high on account of the heavy transportation expenses and government bullion taxes. The average cost of realization per ton of ore crushed is as follows: Government taxes, $0.35; treatment charges (including transportation expenses), $1.08; total, $1.43.

Treatment of Slime.—As already mentioned, the accumulated and currently produced slime in now being treated in a separate plant by a system of agitation and

decantation, centrifugal pumps being used as the means of agitation. The slime plant consists essentially of the following parts and accessories:

Four agitation and four decantation vats, each provided with conical bottoms and connected with its own separate centrifugal pump; two solution tanks placed at the head of the zinc boxes, which receive the solution from the decantation vats; four sets of zinc boxes and three solution sumps, which receive the solution leaving the zinc boxes; one specal solution tank, placed at a higher level than the rest of the plant, and used principally to supply solution to the pump bearings under pressure; two ordinary 3-in. centrifugal pumps, used only for pumping solution from the sumps to any desired vat or to the upper solution tank just mentioned, they being so connected up that either pump can be used should the other get out of order. Each pump is run by a friction clutch pulley, which enables it to be started or stopped in a moment, independently of the other pumps. A small 14- by 15-in. friction-geared hoist is used to convey the slime from the slime pits to the agitation vats. The entire plant is run by a 5-ft. Pelton wheel, making about 115 r. p. m., and operating under a head of 81 ft., using a 4-in. nozzle. Water-power is obtained by means of a 14-in. riveted steel pipe, tapping the main pipe line supplying power to the mill. This 14-in pipe line was brought in by mule back, riveted in 10-ft. lengths, although some difficulty was experienced in its transportation. (Figs. 3 and 4 give plan and section of the slime plant.)

The method of treating the slime is similar to that ordinarily practiced by agitation and decantation; it consists in giving a two days' agitation in the agitation-vats, with from two to three times the weight of cyanide solution, followed by another two (or sometimes three) days' treatment in the decantation-vats; during the latter treatment, the charge, after having been sufficiently agitated with the addition of slaked lime, is allowed to settle as much as practicable, and the clear supernated liquor is decanted and passed through the zinc-boxes. This operation of agitation, settling and decantation of clear solution is repeated as many times as permissible within the time limit of the treatment, being ordinarily three or four decantations.

The material treated, when dried to 20% or 25% moisture, is tough and of the consistency of soft putty. It contains, however, a certain percentage of fine sand and, when viewed in vertical section, presents a somewhat stratified appearance. On long drying, it cracks into layers which are almost absolutely impervious to leaching.

The results of the sizing-test (which are given in Table II represent an average obtained from the material treated.

TABLE II—SIZING-TEST ON SLIME.

Assay value of material was $4.13 of gold and 20.30 oz. of silver per ton.

Size of Material.	W'ght.	Assay Value.		Percentage of Total Values Contained.	
		Gold.	Silver.	Gold.	Silver.
	Per Ct.		Ozs.	Per Ct.	Per Ct.
Retained on 80 mesh	1.1	$2.38	14.22	0.63	0.77
" 100 "	2.7	2.06	13.60	1.35	1.81
" 120 "	5.6	1.96	13.02	2.66	3.59
" 150 "	3.1	2.27	14.14	1.70	2.16
" 200 "	2.7	2.16	13.10	1.41	1.74
Passed 200 "	84.8	4.54	21.68	93.22	90.52
Totals.....	100.0	.....	.....	100.92	100.59

(To be continued.)

The self-cooling transformer finds its best field in outdoor work.

The Baltimore Tunnel Breaker.

This breaker of the Delaware & Hudson Company, near Wilkes-Barre, Pa., is nearing completion. It will have a capacity of 1,200 tons and is to be equipped with electric motors to run the machinery. Line-shafting will be done away with as far as possible and combinations of machines will be run by one motor. A. E. Lister, the mechanical engineer of the company, considers that by connecting several pieces of machinery to one motor there will be advantages not secured by individual motor drives.

Thus if a screen requires a certain horse-power to operate it, the motors coming nearest to that power may be under or over the required capacity. In a combination of machines, a saving may be effected by not having to use too large a motor to insure capacity. Moreover, it is not likely, in the case of two or more rolls operated by one motor, that they will all be overloaded at the same time, and the aggregate of power required should be fairly uniform.

The power plant will consist of two 300-kw., 25-cycle generators, each driven by a 16x26x42-in. cross-compound, non-condensing Hamilton-Corliss engine.

The Delaware & Hudson Co. is a large user of compressed air in its mining operations underground for haulage and pumping. In the last few years, however, a number of electrical installations have been made by it, among the most interesting of which is the equipment of the Baltimore Tunnel breaker.

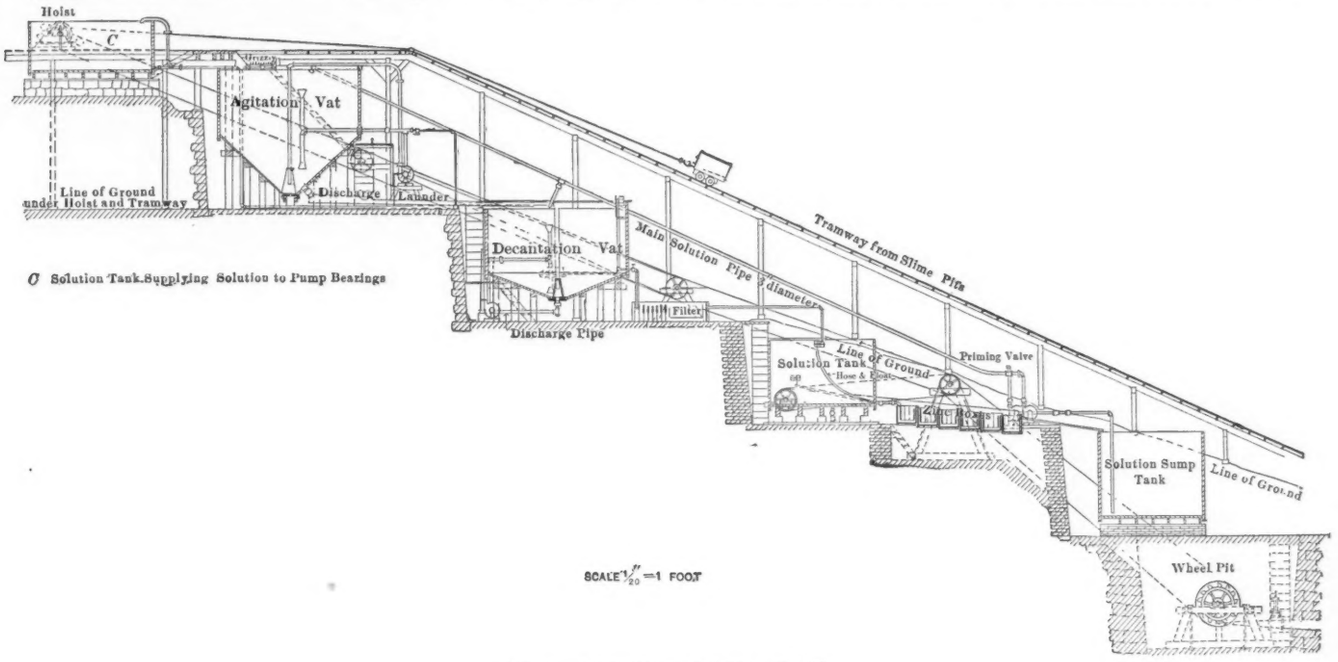


FIG. 4. SECTION OF CYANIDE PLANT.

In smelting iron for foundry work, the melt proceeds more rapidly when a relatively light coke is used; probably because the carbon is consumed more rapidly than when a denser fuel is used.

Apparatus for Laying Dust in Coal-Mines.*

BY J. CRESSWELL-ROSCAMP.

Prof. W. Galloway has said that very little dampness is necessary to prevent coal-dust from igniting, and he has given many instances of explosion in which the flame has stopped when it has come to a part of the road that was only damp, and not wet, as advocated as a necessity by many. It appears to be the general opinion that water is the most potent agent in obviating this danger, and any method by which the dust on all parts of the roadway, such as the roof, timbers and vertical surfaces, can be dampened effectually, will naturally commend itself. In application, the nearer the water approaches the condition of aqueous vapor, the greater will be its power, and the more complete its success.

Many attempts have been made to water and lay the dust in coal mines, but no apparatus, hitherto devised for this purpose, has been entirely satisfactory in efficiency and practice.

One method by which this has been effected is an improved watering car,[1] which, in outward appearance, is similar to an ordinary colliery car. The mechanism is simple, consisting of two small pumps *A*, with cylinders 3 in. in diameter by 2 in. stroke, and an air chamber *B*, 7 in. in diameter and 14 in. high. The pumps are driven direct from one axle *C* of the tub, and connected to three sprayers or nozzles *D*, fitted so that either one or all may be used. In this simplicity of construction there are several advantages, as no packing is required, there is no gearing to get out of order, and, in fact, the whole contrivance is readily handled and easy of access.

The water (carried in the tub *E*) is forced by the pumps *A* into the air cylinder *B*, which causes a regular and unpulsating column to flow along the pipes and out of the nozzles D. These nozzles are fitted with a specially constructed screw apparatus, around which the liquid is forced, giving the spray a circular momentum reaching a breadth up to 30 ft. The sprays are in the shape of inverted cones impinging on each other and becoming so completely atomized and aerated that they in reality form a vapor. This vapor is carried along by the air current, and can clearly be felt from 100 to 150 ft. behind the tub, when it is in motion.

In this way the whole surface of the roadway is damped. Where water is applied with any force on dry dust, it runs off with the finer dust in the form of spherules and then becomes a means of raising the dust rather than laying it. The spray, on the other hand, does not have any ill effect on the roof, floor or sides of the roads.

The car will travel and do its work quite as efficiently by any means of haulage, main-and-tail, endless rope, or horse; and it is quite as easily moved along by hand as any ordinary car.

FIG. 1.—SECTION ON LINE AB OF FIG. 3.

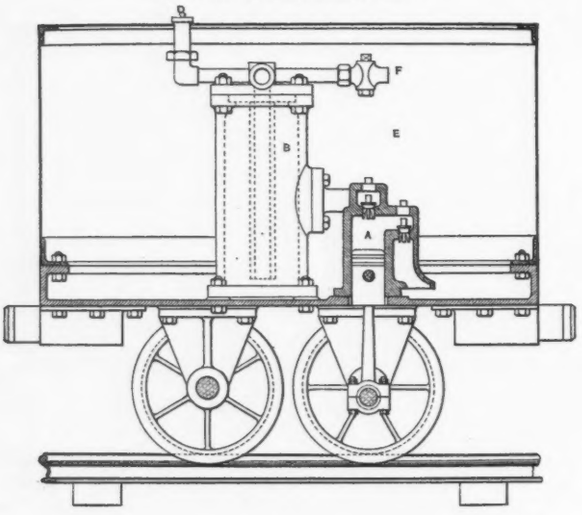


FIG. 2.—SECTION ON LINE CD OF FIG. 3.

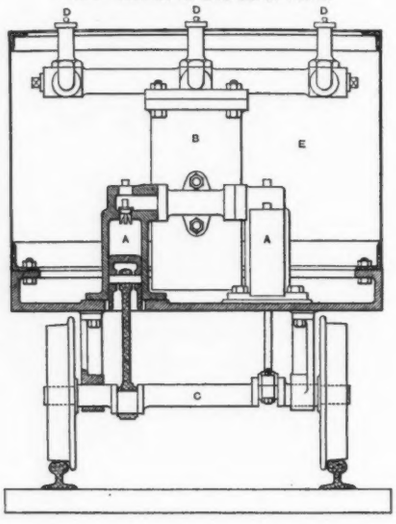


FIG. 3.—PLAN.

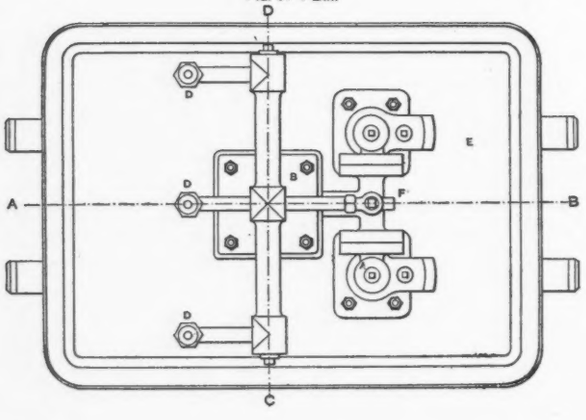
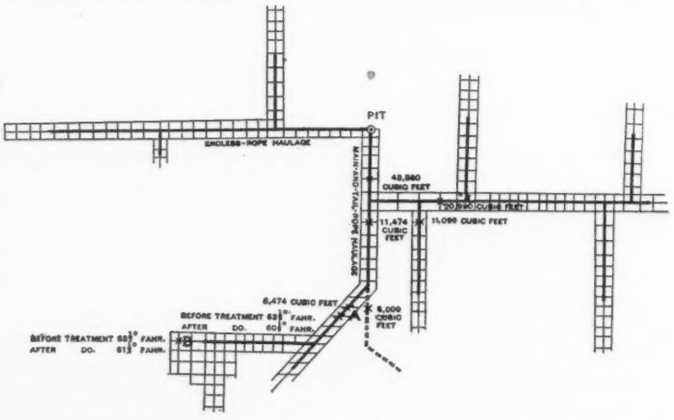


FIG. 4.—PLAN SHOWING HAULAGE-ROADS AND VOLUMES OF VENTILATING CURRENTS, ETC. IN A COLLIERY



The liquid sprayed need not necessarily be water; lime-water, whitewash or any other preservative of timber may be ejected in a similar manner.

A tub of ordinary size contains sufficient liquid to lay the dust over a distance of between one and two miles of roadway.

A tap *F* is fitted to the pipe connecting the pumps and the nozzles, and when this is turned the liquid flows back into the tank instead of out of the nozzles, when a spray is not desired.

Tables I, II and III contain the results

*Abstract of a paper in *Trans.* of Inst. of Min Eng., 1905, XXVIII, iv, 578-584.

[1]British patent, 1903, No. 9,268, F. Herbert and P. Kirkup.

of a few personal experiments, and they fully justify the assertion that the imminently dangerous properties of coal-dust are minimized to an infinitesimal quantity by the treatment herein described.

TABLE I—THERMOMETER READINGS BEFORE AND AFTER THE PASSAGE OF THE IMPROVED WATERING CAR.

Time.	Thermometer. At Bank.	Thermometer. Underground.	Barometer. At Bank.	Barometer. Underground.	Dry-bulb Thermometer.	Wet-bulb Thermometer.	Humidity.
a. m.	°F.	°F.	In.	In.	°F.	°F.	%
11.30(a)	53½	64	29.99	30.67	61	58½	83.4
11.45(b)	..	..	....	....	60⅜	59⅛	89.2
12.0	..	..	....	....	60⅜	59	88.1
12.15	..	..	....	....	61	58⅜	85.4
12.30(c)	57	66	30.06	30.72	61	58½	83.4
11.30(d)	59	68	29.83	30.46	64½	62	82.4
11.45(e)	..	..	....	....	64	63⅜	91.2
12.0	..	..	....	....	64½	63	90.5
12.15	..	..	....	....	64½	63	89.8
12.30	..	..	....	....	64½	62⅜	87.3
12.45	..	..	....	....	64½	62½	84.9
1.0	64	69	29.80	30 44	64½	62	82.4

(a) Raining; (b) car passed the hygrometer at 11.35 a. m.; (c) dry and warm; (d) dry and warm; (e) car passed the hygrometer at 11.35 a. m.

TABLE II—THERMOMETER READINGS BEFORE AND AFTER THE PASSAGE OF THE IMPROVED WATERING CAR.

Time.	Thermometer. At Bank.	Thermometer. Underground.	Barometer. At Bank.	Barometer. Underground.	Thermometer in Haulage-road, A. Before.	After.	Difference.	Thermometer at Coal-face, B. Before.	After.	Difference.
a. m.	°F.	°F.	In.	In.	°F.	°F.	°F.	°F.	°F.	°F.
11.0(a)	56½	66½	29.40	30.56	63½	...	...	63½	..	...
11 30(b)	...	...	....	....	...	60½	—3	...	61½	—2
12.0	...	...	....	....	...	61½	+1	...	61	—½
12.30(c)	60	67½	29.38	30.56	...	62½	+1	...	61	—0

(a) Raining; (b) tub passed the thermometer in haulage-road at 11.10 a. m.; (c) volume of air at face, 1,400 cu. ft. per min.

TABLE III—TRIAL OF THE IMPROVED WATERING CAR.

No.	Description.	Distance.	Time.	Speed per Hour.	Roadway. Perimeter.	Roadway. Surface.	Roadway. Calculated Surface of Timber, &c.	Roadway. Total Surface.	Water Used.	Surface Wetted per Gallon of Water Used.
		Ft.	Min.	Miles.	Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.	Sq. Ft.
1	Tub drawn by main-and-tail rope..	2,970	3¾	9	35	103,950	31,200	135,150	60.87	2,220
2	Tub drawn by horse.....	1,854	8½	2.49	35	64 890	16,656	81,546	44.27	1,842
3	Tub drawn by endless rope.....	4,800	13⅔	4	34	163,200	74,400	237,600	110.27	2,154

[In the discussion of this paper, G. H. Coates stated that he had seen one of these watering cars at work on a dry and dusty roadway, and it afforded an efficient method of dealing with the problem. He was of opinion also that if a liquid disinfectant were used in place of water it might materially assist in maintaining immunity from ankylostomiasis.

H. Richardson Hewitt considered it doubtful whether a spray of water had any beneficial results, since only the upper portion of the dust on a roadway would be wetted, which was not sufficient to reduce the danger unless the dust was frequently stirred up, and as frequently watered by the spraying apparatus. He agreed with Prof. W. Galloway that "very little dampness is necessary to prevent coal-dust from igniting," so long as this dampness permeated the whole of the available dust, and should then approximate to the recommendation of the Prussian Fire-damp Commission, namely, that the coal-dust should take up 50% of its weight of water. An apparatus such as that described would do good, so long as it was very frequently used; but from experience he found that dusty roadways were seldom watered, excepting when shots were about to be fired.

From the experiments made by Mr. Cresswell-Roscamp it appeared that the application of water was best effected by horse-traction, that being the slowest manner of distribution. The humidity-tests showed from 82.4 to 91.2% of saturation, which is excellent if this state could be maintained; but the natural amount of humidity in the mine-air, without the watering being done, should have been stated. At the Maybach colliery, Saarbrücken, where a water-pipe installation was at work, the humidity varied from 69 to 92%; and, when compared with the results obtained before the mine was watered, these figures showed an inconsiderable difference.

F. Winkhaus said that the apparatus described by Mr. J. Cresswell-Roscamp was of special interest, inasmuch as it turned to profit the action of compressed air in producing a good dust-dispersal with the smallest conceivable waste of water. It appeared doubtful, however, whether it would prove useful where the dust-emanation took place directly at the working-places and where in consequence its removal was necessary, both there and in the roads leading to them.

In Westphalian mines, such an apparatus would meet with absolutely no success, because the production of coal-dust is principally at the working-places, or in their immediate neighborhood. This is the reason why the regulations of the Dortmund district require that hose-pipes be distributed throughout both main-roads and branch roads and shall reach directly to the working-places. All other means (water-cars, watering-cans, hand-syringes, etc.) appeared unable to cope with the widespread distribution of dust in the mine-workings. Their application was therefore only exceptionally and occasionally allowed by the authorities as a makeshift.[1]]

[1] *Glückauf*, 1898, XXIV, p. 586.

Aid in Mining Accidents.

SPECIAL CORRESPONDENCE.

While the number of accidents in the mines of the anthracite region is undoubtedly increasing, the operators are certainly doing everything in their power, not only to prevent accidents, but also to prevent suffering, when they do occur, and to minimize the results. The various companies are organizing surgical corps, to co-operate with the hospitals, and to teach miners what to do, and how to do it when immediate aid is required for an injured man. Such need is of almost daily occurrence in some large collieries; while accidents happen at times in every mine. The latest plan is that adopted by General Manager W. A. May, of the Hillside Coal & Iron Co. He has made arrangements with a physician for the instruction of the employees of the company in administering first aid to the injured. A class of 20 men will be organized at each colliery, the first being at Forest City. A course of lectures will also be given at each colliery, as follows:

Introductory remarks, including objects of instruction; a general outline of the structure and functions of the human body, including a brief description of the bones, muscles and blood-vessels; the functions of the nervous system; skin absorption; circulation, respiration and excretion; general use of the Esmarch triangular bandage and practical instruction in its application.

The second lecture treats of the importance of surgical cleanliness; general directions in rendering first aid; the course of the main arteries, indicating the points where the circulation may be arrested by digital pressure, or by the application of a tourniquet; the difference between arterial, venous and capillary bleeding, and the various means of arresting such; practical instruction in the arrest of bleeding by digital pressure, the tourniquet and the triangular bandage.

The third lecture relates signs of sprains, dislocations and fractures, and first aid to be rendered in such cases; the improvising and application of splints and other restraining apparatus; first aid in wounds, burns and scalds; what to do when the clothing catches fire; removal of foreign bodies; practical instruction in the application of improvised splints, dressings and triangular bandage.

The fourth lecture describes methods of lifting and carrying the sick or injured; carrying by stretchers; conveyance by rail or otherwise; preparations for their reception; practical instruction in lifting, carrying and conveying by improvised methods.

The presence at each colliery of a number of trained, or at least partly trained, men ought to prove of much value in cases of accident. Prompt action in many such cases makes a wide difference in the results.

Cyanidation of Silver Ore.

BY GRANT N. MILLER.

The articles on cyanidation of silver ores, by Hugh G. Elwes (this JOURNAL, July 25, 1905), are of moment to those engaged in Mexican mining. It may be of interest to give an exemplification of practice at a 130-ton mill in western Chihuahua.

The ore assays two-thirds silver and one-third gold in value. It is crushed, with 950-lb. stamps, to pass a 30-mesh No. 29 iron-wire screen. The pulp is concentrated on Wilfley tables, which make a saving of 20 to 25% of the value. The tailing from the concentration is then classified into sand (three-quarters of the bulk) and slime (one-quarter). The sand goes to a cyanide leaching plant, composed of 18 vats of 80-ton capacity each. The period of treatment is 15 days, a 0.25% sodium-cyanide solution being used. The slime is settled in a series of six ponds, of an average capacity of 900 tons each. When a pond is filled with settled slime it is opened at one end, and the material is loaded into cars which deliver to the filter-pressing plant. Four mechanical agitators are used. Each charge of slime receives eight hours' agitation with 0.5% sodium-cyanide solution, after which it is run into receivers and charged into the filter presses.

The total recovery, including the small amount of concentrate, is 84%; the silver extraction being about the same as that of the gold, and the slime filter-pressing plant giving about the same result as the sand-leaching plant. Some additional apparatus is now being constructed which will increase the recovery to nearly 90 per cent.

An incident recently happened which is useful in connection with cutting sheet zinc for use in the precipitating boxes. A Mexican boy, who had charge of the zinc-cutting lathe, was shown that there was considerable loss of zinc, owing to the difficulty of setting the cutting tool near enough to the steel mandrel. He immediately stopped work, disappeared and returned in a few minutes with a bucket of sawdust. Then, after keying the first sheet of zinc into the 5-in. mandrel, he wrapped between the sheet and the mandrel a layer of sawdust a quarter of an inch deep. This served as a core for the layers of zinc, which were then successively overlapped and wound. The result was very satisfactory, as the only loss was the small strip of zinc which was fastened in the keyway.

Discovery of Coal in Cape Breton.

According to the Halifax *Herald* of July 19, 1905, an important discovery of coal was made recently by Deputy Inspector of Mines Neville, who uncovered the northern outcrop of the Mullins seam near Lingan. This locality is about 9 miles from where the Cape Breton Coal, Iron & Railway Co. is operating at Broughton. The discovery was made on a lease of the Dominion Coal Co. The Mullins seam at this point shows 6 ft. of clean coal, and its outcrop is said to measure 18 to 20 miles, giving a land area of about 100 sq. miles. This discovery should add a long lease of existence to the operations of the Dominion Coal Co. It also seems to establish the important fact that the Tracey and Mullins are two distinct beds, a matter about which there had been some doubt.

Spitzbergen Coal.

BY CONNER MALOTT.

Spitzbergen has long been a no-man's land. However, according to Olaus Jeldness, of Spokane, there is 21 ft. of soft coal in sight on one harbor, and a vast quantity of hard coal on another. The exposure of iron ore is also in large figures. The State Department at Washington gave an opinion that Spitzbergen belonged to Russia. That claim, however, was vigorously resented by Norway, and an expression from Russia was obtained to the effect that it considered Sptizbergen "a land without a flag." Boston men are interested in a development scheme involving a large outlay.

Flushing Culm Into Mines.

In flushing culm into old mine workings, the Delaware, Lackawanna & Western Railroad coal department uses Wyckoff wood pipe. These maple-wood pipes cost about one-fifth less than wrought and cast iron pipe, including labor of erection. The first cost of the wood pipes is one-third less than the metal pipe.

The D., L. & W. company uses about 6,000 ft. of this pipe, and during the last three years has given it a quarter turn two times. That is, to obtain longer service from the pipe, it is turned part way around when the bottom is worn thin. The wood pipe has given excellent satisfaction, and the culm from the washeries is flushed through it equally as well as through metal pipe.

Prevention of Hoisting Accidents.

BY A. SELWYN-BROWN.

Hoisting accidents are not now so numerous, proportionately, as they were formerly, when mining was carried out on crude principles and with appliances much below the standard of quality of those now in use; but, at not infrequent intervals, serious accidents in shafts remind us of the fact that carelessness is still displayed in the lack of preventive measures. On turning to official statistics relating to accidents in mines, it will be noticed that hoisting accidents still occupy a prominent position; quite recently numerous accidents from broken ropes impelled the chief inspectors of mines in Pennsylvania and Colorado to issue drastic orders relating to the equipment and the testing of safety appliances for shafts in mines under their supervision. As this matter is being forceably brought to the attention of many mine superintendents at the present time, a brief reference to the most effective means adopted for the prevention of hoisting accidents may prove useful.

There is no factor in shaft mining on which the safety of workmen depends so much as upon the hoisting rope. The necessity of using ropes of the highest quality and with a high factor of safety is now generally recognized; it is in their proper care that laxity prevails. Generally speaking, less attention is given to the preservation of hoisting ropes than to appliances of minor importance.

Every rope used for hoisting men should be carefully inspected daily; it is well to bear in mind that deterioration commences at the time it is wound on the drum and started with its first load. A few broken wires in different parts of a rope will not greatly weaken it; but when several fractures are discovered close together, they show that the wires have become brittle; this condition, as well as any evidence of internal corrosion, should cause the immediate condemnation of the rope. Whenever internal corrosion is suspected, the strands should be slightly untwisted to enable the interior to be inspected.

The diameter of mining ropes is reduced by wear and by both internal and external corrosion caused by oxidation or the action of mineral waters. Violent vibrations induce considerable elongation in a rope bearing a heavy load, and if long continued, or repeated at frequent intervals, they may induce "permanent set," which will seriously weaken it. The reduction in the cross-section of a rope can be approximately found by simple measuring. This is rarely attended to; but periodical measurements would often give warning of rapid deterioration not otherwise noticeable. A careful record should be kept of every rope, giving the date of its manufacture, the exact diameter when new, the length of time employed, the quantity of material hoisted by it, and a description of any important changes noticed during its periodical inspections.

The life of a hoisting rope is influenced by the use to which it is put and by the amount of care it receives. A rope kept free from moisture, well lubricated, and wound singly around a drum of large diameter and worked at a slow speed will outlast one carelessly worked at a high speed over a small sheave and drum and allowed to get damp. The quantity of material raised or the work done, under careful conditions, is the measure of a rope's durability; not the time it is employed.

Ropes that have been stored for any length of time should be thoroughly tested, as oxidation, due to the action of atmospheric moisture, is certain to occur

on the interior strands. For this reason, freshly manufactured ropes should be secured whenever possible.

Abrasion of the strands by each other in winding on the drum is a frequent cause of wearing. The bending to which all ropes are unavoidably subjected causes them to unstrand and the compound wires to become brittle or of unequal length; consequently they are subjected to unequal strains. Side friction should be minimized as much as possible. This may be done by using a long drum of ample diameter. A rope winding in a single layer on a grooved drum will considerably outlast one working under similar conditions on a small drum and winding in several layers.

The greatest strain on a hoisting rope occurs whenever the load is suddenly started or stopped. This strain sometimes amounts to as much as ten times the working load, and in addition to exceeding the factor of safety, it causes the metal to become "fatigued" and brittle. For these reasons, a sudden application of

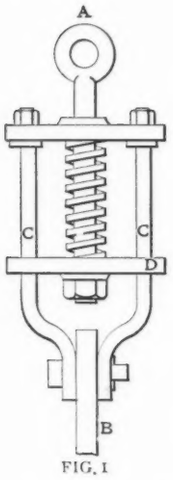


FIG. 1

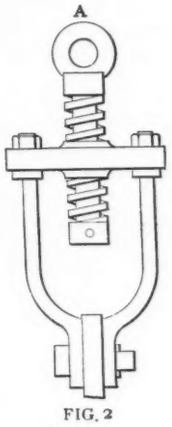


FIG. 2

the brake is injurious, and starting and stopping should always be done slowly.

Usually a rope weakens most noticeably near the socket. This may be due to corrosion in a badly-fitted socket, to bending caused by too much slackening, or to the inclination of the cage. Accidents from this cause may be prevented by cutting off a few feet of the rope at frequent intervals and turning it end for end. The straining caused by excessive vibration, through sudden starting and stopping, may be greatly diminished by employing a bridle chain between the rope and the cage, and especially by the adoption of a spring coupling. There are many kinds of these. A well-tried type is shown in Fig. 1. It consists of a moving plate *D*, held in position by the bars *C*, and carrying a strong spring attached to a fixed plate. The design in Fig. 2 is better. In this coupling, the sliding plate is removed; there are two springs which are attached to the top and bottom of the fixed plate. This obviates any trouble that might occur through the blocking or unequal wear of the holes in the sliding plate of the earlier type. Both of these couplings have been well tried. They are simple in construction and can be made by any ordinary blacksmith. Their use leads to the prolongation of the life of a rope, by greatly reducing the causes of insidious brittleness in the wires.

Experience has demonstrated the util-

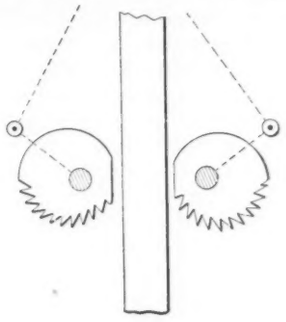


FIG. 3.

ity of the following advice regarding the care of hoisting ropes.

1. Minutely examine the full length of the rope daily.

2. Beware of mere appearances. Ropes with strands containing brittle wires sometimes look as good as new. The strength and reliability of a rope can only be ascertained by actual tests.

3. Cut off about 6 ft. from the cage end every three months, and reverse the rope.

4. If tests are not made from the cut-off end to find strength, the rope should not be used longer than a year.

(6) Strained, frayed and spliced ropes should never be used for hoisting men.

(7) Use a lubricant that is rich in fat, that does not harden, and that is free from acid. It should be frequently applied as a protection against dampness or atmospheric moisture.

These precautions will considerably reduce the danger; but they alone are not sufficient to afford protection against loss of life; the efficiency of safety catches for

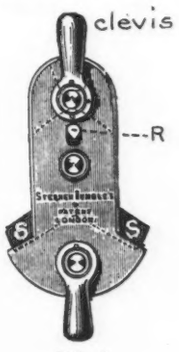


FIG. 4.

mine cages being recognized, they also are adopted on all well-regulated mines.

The commonest and most efficient safety catches are made on the principle of the design shown in Fig. 3. When the rope is taut, the small dogs are held away from the wooden cage-guides; but, in the event of a break, powerful springs come into action and cause the dogs to fly instantly over to the guides, to bite into them, and to cling by their teeth, thus suspending the cage. When these catches and the guides are kept in good order, they are absolutely reliable. Their action is rapid, and the cage rarely travels more than an inch between the breaking of the rope and the biting of the dogs.

The working condition of these catches is usually tested by attaching the cage to the rope by a short length of hemp rope. It is then possible to free the suspended cage by cutting the rope and allowing the catches to act.

Overwinding is provided against by a multitude of ingenious devices. The most effective, and that most generally applied, is a simple detaching hook (like that shown in Figs. 4 and 5). In this hook, two scissor plates (*S*) are normally held in position by a copper rivet (*R*); should the hook be drawn through the hole in the catch-plate, the scissors shear the copper rivet, and, spreading out, they free the clevis, grip the catch-plate (*C*), and suspend the cage.

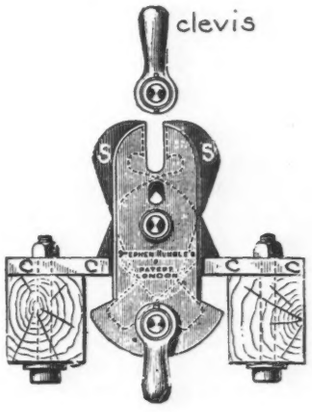


FIG. 5.

An additional precaution against accident from a cage falling through overwinding is furnished by automatic chairs that are sometimes placed in the head frame below the sheave wheel at a distance a few inches greater than the length of the cage.

Excessive hoisting speed is provided against by many devices that automatically shut off steam on the hoisting engine and apply the drum brakes. Usually they are attached to, and work from, the cage-indicator spindle. Two vertical racks placed behind the spindle are connected with a ball governor. When the engine's speed increases, the racks approach the spindle and connect with a nut on the indicator; this applies two levers attached to the drum brake, and the valve of the steam engine.

Many hoisting engines are fitted with auxiliary throttle valves, one being placed immediately above the other. This is a wise precaution against accident from the working valve becoming disabled in any way.

Mr. Mitchell's Campaign.

BY R. W. RAYMOND.

Mr. Roosevelt's recent address, in the anthracite region, on temperance and other matters, contains nothing objectionable. But his appearance under the auspices of John Mitchell was undoubtedly construed by his vast and tumultuous audience as renewed proof that the President of the United Mine Workers commands the active support of the President of the United States in the campaign which he is now prosecuting. This lends importance to the question, What is the purpose of Mr. Mitchell's campaign?

According to his own account, he is trying to persuade the miners to rejoin their local unions and resume the payment of dues. This is the one permanent and principal endeavor of labor leaders. The members of the unions are always falling away in times of peace and content; and it is too often the case that, in order to bring them back, their leaders must do or threaten something aggressive toward employers. In the present instance, Mr. Mitchell professes to fear that the coal operators will attempt, next April, to reduce the wages established by the Commission of 1902, unless, at that time, the unions should be strong in numbers and funds. And while he declines to say positively that he favors another strike in April for still better terms, he declares that he "does not intend to rest" until the wages of miners shall have been made equal to those paid in other trades requiring equal skill and involving equal hazard.

Mr. Mitchell must think the American public has no memory. The award of the Anthracite Strike Commission of 1902 distinctly declared that the wages of anthracite miners were already not less, if not even greater, than those of other workmen of similar grade. In fact, that award decided against Mr. Mitchell on nearly every point in his original contention.

The circumstance that, after thus showing the entire lack of justification for the strike, the Commission proceeded to order an increase of 10% in wages, occasioned a good deal of comment, in reply to which Judge Gray wrote to the *Evening Post* that the increase was decreed because of the irregularity of the employment. It might have been answered that this irregularity was due to the action of union miners themselves, in abandoning work on frivolous pretexts. During 1901, apart from cases of accident to plant, there was no day when the anthracite coal operators were not anxious to run the collieries at full capacity. But there were innumerable occasions (more than a hundred in the collieries of a single company) when the capricious observance of holidays, or the occurrence of petty strikes without warning, shut up collieries for from a couple of days to a couple of weeks. For instance, the discharge of a boy driver for beating a mule to death, and the discharge of a pump man for drunken carelessness causing the breakage of machinery, were followed by strikes which stopped work for many days. The local union committees took up the cases at their leisure, and finally decided that the strikes were unjustifiable, and ordered the men back to work. But nobody paid the company for a fortnight's loss of business. Of course, in such cases, the abandonment of work by a portion of the force may make it necessary to stop all operations, throwing out large numbers of men who do not wish to be idle. In other words, the members of a union, though not constituting even a majority of the force, can stop the colliery. The "irregularity of employment" in 1901 was not the wish nor the interest of the operators; it was not the will of non-union miners; it was the wanton work of local unions.

Consequently, the remedy for irregularity of employment did not logically consist in rewarding with increased pay the men who caused it, as well as those who helplessly suffered from it. In fact, the increase of wages ordered by the Commission was a simple concession, urgently desired by the operators. It is the fatal defect of such arbitrations that they are intended, not to enforce justice, but to secure peace through compromise. Arbitrators do not usually state facts and reasons fully, and hence their awards, being accepted by both parties, are not open to public criticism. The Anthracite Commission differed from ordinary boards of the knd, in that it was directed to inquire and report, as well as decree. Consequently, it should not be ridiculed because its decision was not in accord with its findings of fact. Many another arbitration, if laid equally bare to inspection, would show a similar discrepancy.

But the facts, as laboriously determined by the Commission, surely have some weight. They ought, at least, to bar the reiteration by Mr. Mitchell of the assertions so confidently made and so completely discredited a couple of years ago. And any renewal of conflict and disorder on such grounds should receive no incouragement from any citizen of the United States, even if he happens to be President.

As to the alleged possible danger that the operators, in April next, may attempt to change, to the injury of the employees, the present terms established at their own request, the paper of President David Wilcox in the *North American Review* (August, 1905) is conclusive. There is no danger.

Testing Briquette Pitch

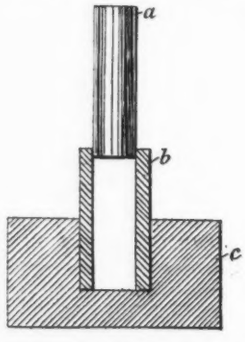
BY O. BINDER.*

The best method of testing pitch for use in briquette making is by means of a small experimental press, which turns out sample briquettes. If, however, such a special press is not available, such a one as that shown in the accompanying illustration will answer the purpose. The following is a description of the device and its operation:

Take a small so-called "diamond mortar," consisting of a piston *a*, an annular cylinder *b* and a base with a cylindrical hole *c*. Heat the whole to 100 to 150° C. in a drying oven or on a hot plate.

The mixture of pitch and sand or powdered coal is heated in a porcelain crucible or iron pot until, on stirring, it begins to feel sticky and to give off a small amount of fume, showing that the pitch is well melted. It is well to thoroughly mix the ingredients before heating. If a thermometer is used for stirring, the temperature can be observed at the same time. The hot mixture is quickly transferred to the cylinder *b;* piston *a* is put in its place and a stout blow is delivered to it with a hammer (about 2 lb.), holding the apparatus in a pair of crucible-tongs. After three or four blows, the briquette is finished, the hollow cylinder *b* is taken out and the briquette pushed out cautiously by means of the piston. It will still be hot, and must be allowed to stand for some time until quite solid.

In order to compare different kinds of pitch, it will be advisable to use some



standard material which can be obtained in uniform quality, such as sea sand or some kinds of anthracite. A series of experiments might also, with advantage, be made with different kinds of coal to determine the quantity of pitch required for each. There does not seem to be much object in determining the "softening temperature." It is, after all, rather immaterial whether the pitch be heated somewhat higher or lower in preparing the briquette. Whether the briquette will soften in the sun is best determined by an actual exposure test, for there is not much connection between the softening point of a pure pitch and that of one mixed with 95% coal.

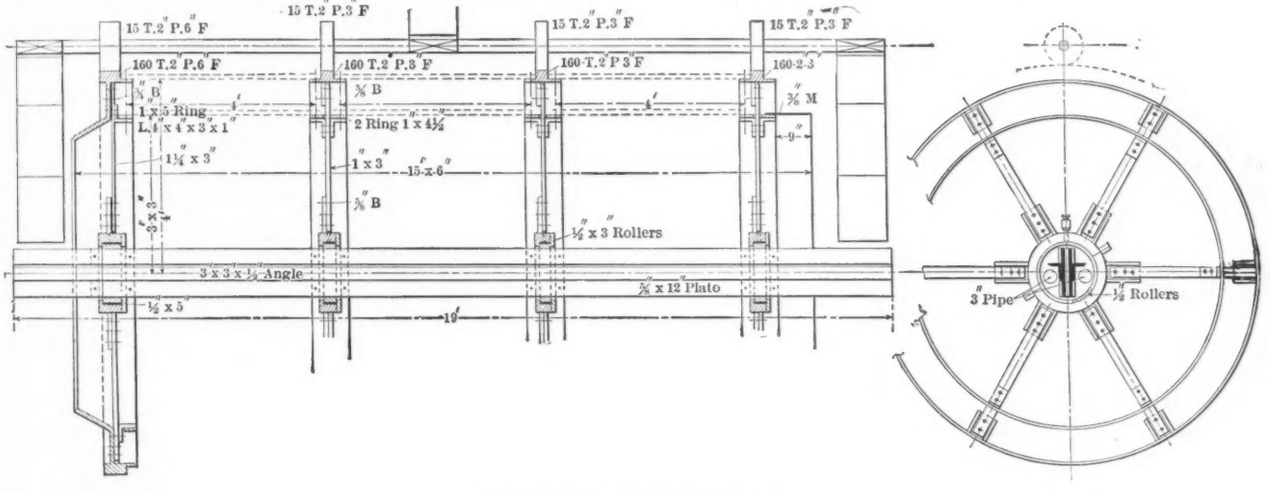
Another interesting experiment would be the making of a coking test with coarse fragments, or with an entire briquette, to examine its behavior in the fire. It may be found that a suitable pitch does not by any means cause the briquette to crumble with heat, but, on the contrary, it may impart the property of "caking."

*Translated from *Zeit. f. angew. Chem.*

Rotary Screen on Fixed Shaft.

The new plant of the Trevorton Coal Land Co., near Trevorton, Pa. (on the Philadelphia & Reading railroad), contains something which is a decided innovation in screens. To clean the coal thoroughly, the breaker is equipped with two rotary screens; these revolve on fixed shafts. Water is introduced through two 3-in. pipes running near, and parallel to, the shaft. The coal in these screens requires large quantities of water for proper washing. Ordinarily, in the cylindrical type, the wash water falls on the top of the screen, and thence through the meshes to the coal below. By this method considerable water is wasted. Part strikes the screen and splashes off; and that dropping through the mesh does not reach the coal as effectively in the rotary type as it does in this new device.

The details are shown in the accompanying illustration. It is a double-jacketed screen and makes broken, egg, stove and nut sizes. The screen, revolving about the stationary shaft, has four bearings with a ½ by 5-in. roller-bearing at the receiving end, and ½ by 3-in. rollers at the other bearings. A peripheral drive, meshing at four points, is used. The screen shaft is built of two ⅝ by 12-in. plates, further stiffened by two 3 by 3 by ½-in. angles. Castings, made in halves, are bolted to the shaft by means of short angles, and carry the rollers. The screen spiders are kept in place on the bearings by annular plates. The screen-plates are shown in dotted lines. The life of this shaft should be lengthened by introducing the wash water so that it does not strike it. Theoretically mine water is not supposed to be used in washing coal but practically it is frequently necessary to so use it. Especially in the summer, water often becomes scarce about many anthracite colleries. A saving in the amount of water required, and in greater efficiency of that used, are important factors in screen practice. Messrs. Pettebone & Ireland, architects and engineers, Coal Exchange building, Wilkes-Barre, Pa., were the designers of the Trevorton plant



ROTARY SCREEN ON FIXED SHAFT.

Mexico's New Tariff.

Consul Louis Kaiser, of Mazatlan, Mexico, sends a synopsis of the modified tariff recently enacted by Mexico, and which will become operative Sept. 1, 1905. In the list are the items on which increases have been made; the old and new rates are given, the old rates inserted in parentheses. The "gross kilo" includes the entire packing or casing; the "net kilo" refers to goods without packing or casing. The legal kilo is that prescribed in the tariff act and affected by certain regulations named in the act. Following are the items relating to mining and metallurgy: Candles, tallow, per gross kilo (18 cents), 20 cents; candles, or wax tapers, per legal kilo (60 cents), 70 cents; coined silver, money of Mexican mintage, in pieces of 1 peso, when imported in amounts exceeding 5 pesos, per gross kilo ($10), $15; columns, steel or iron, when they have perforation or a special cut, brackets, bedplates for columns, fish plates, braces, with or without bolts, and other pieces of iron or steel for building purposes, not otherwise specified, per gross kilo (3 cents), 4 cents; electric lamps, incandescent, commutators, extinguishing devices, circuit closers, with handles, fuses, cut-offs, rosettes and safety pieces, per gross kilo (10 cents), 11 cents; electric lamps, arc, per gross kilo (5 cents), 6 cents; girders, iron or steel, not having perforations, nor special cut, per gross kilo (2 cents), 3 cents; girders and columns of iron or steel that have perforations or special cut brackets, bedplates for columns, fishplates, braces, with or without bolts, or other unspecified pieces of iron or steel for building purposes, per gross kilo (3 cents), 4 cents; hoops, iron and clasps for fastening packages, per gross kilo (1 cent), 2½ cents; machines of all kinds for industry, agriculture, mining and the arts, not specified, and their loose parts, or repair pieces, per 100 kilos ($1.50), $1.65; oil, impure mineral, per net 100 kilos (3 cents per net kilo), $3.30; oil, refined, mineral, benzine, paraffin and mineral wax, per legal kilo (8 cents), 9 cents; rails, iron or steel, when the weight of the linear meter does not exceed 10 kilograms, per gross kilo, 2 cents; rails, iron or steel, when the linear meter does not exceed 10 kilograms, and switches, turtles, ties, frogs, spikes and fishplates, for laying rails per gross kilo, 2 cents (at present rails pay 1 cent per gross kilo, when the linear meter weighs more than 12 kilos, and are free when the linear meter does not weigh more than 12 kilos); sacks of jute, pita, ixtle, henequen or hemp, specified in section 382, per gross kilo (11 cents), 12 cents; steel, in bars, of various shapes, per 100 gross kilos (5 cents per kilo), $5.50; wire, of copper, brass, bronze, or white metal, lined with any substance, per gross kilo (5 cents), 10 cents; wire, naked, of copper, brass, or white metal, not exceeding 2 millimeters in diameter, per gross kilo (8 cents), 10 cents; wire, naked, of copper, brass, bronze, or white metal, exceeding 2 millimeters in diameter, per gross kilo (5 cents), 6 cents; wire, iron or steel, more than 1 millimeter in diameter, per 100 gross kilos (5 cents per kilo), $5.50; wire, iron or steel, 1 millimeter or less in diameter, per gross kilo (8 cents), 9 cents; wire, for fences, per 100 gross kilos, $2.50.

The free list comprises apparatus for the extinction of fires and scientific instruments.

Foreign goods only will be subject, on their importation, to the foregoing rates plus the tax of 1½ or 2% collected by the custom houses in behalf of the municipalities, in accordance with the provisions of article 7 of the general custom house ordinance: and in given cases the decree of July 1, 1898.

Article 3 of the decree of Feb. 23, 1897 (which reduced by 50% the import duties on iron piping intended to be used for city water supply systems), and the provisions of all laws, circulars and other

legal enactments contrary to the terms of the present decree, are repealed, except the provision of the law of March 25, 1905 (which granted certain franchises to mining), and the provisions of the law of May 30, 1905 (which exempted from payment of duties such foreign articles as being included among those designated by the executive are imported into the territory of Quintana Roo for consumption therein), which provisions are to remain in force for the time fixed by the laws mentioned.

Accessory Equipment of Electric-Furnace Plants.

M. M. GREEN.

The striking devlopment of manufacturing by means of the electric furnace, during the past decade, has brought many interesting problems to the metallurgical engineer. As a general thing, the process in the furnace itself is comparatively simple; but the nature of such raw materials as silica sand, coke, lime and corundum, and of resulting products as carbide of calcium, carborundum, siloxicon, etc., when heated to an intense temperature, makes the manipulation of them burdensome and imposes unusually severe conditions on machinery. In many respects some of the electric-furnace plants resemble portland-cement mills; as regards crushing and milling machinery, they are relatively in the same crude stage in which the cement industry was 25 years ago. In the latter, we see limestone and shale crushed, dried, pulverized and then mixed in proper proportions for a definite chemical compound. This mixture is calcined to cement-clinker in rotary kilns, by coal firing, and the red-hot clinker is cooled, preparatory to crushing, pulverizing, screening and packing. The heavy wear and tear endured by crushing and pulverizing machinery in cement mills, and the resultant costly repairs, are known to the sorrow of every cement manufacturer; yet continual improvement has made the American cement industry so automatic and continuous that they turn out their product for $4.50 per ton, in spite of an elaborate mechanical and chemical process.

In such electrochemical plants, as make carborundum, siloxicon or graphite, the raw material (as glass sand, coke and coal) are crushed, pulverized, mixed in definite proportions and then fired at a temperature of about 7,000° F. in the electric furnace. The requisite high temperature, combined with the quality of such material as siloxicon or carborundum, render their manipulation more difficult than that of cement clinker. Furthermore, while cement furnaces are continuous and automatic, electric-resistance furnaces are intermittent and require much manual labor, thus complicating matters by inserting a weak link in the chain. As in the cement industry, so the materials from the electric furnace are cooled, ground, screened and packed; and, in the case of carborundum, cemented into commercial forms, kiln-fired and machined to size. The raw materials and various stages of manufacture will be discussed in some detail.

Raw Material Mill.—(a) Crushing of coke; the coke used must be low in ash, to avoid loss of power consumed in volatilizing the impurity, hence hard, massive bee-hive coke is used. The raw material mill should have a spur track running along in front for receiving cars. The coke crusher should be placed so that men can fork from a box-car directly into the crusher, which should be of ample capacity to treat 4 or 5 tons per hour. Such capacity will keep the crusher running ahead of the men and will insure unloading a car in daylight. As good bee-hive coke may come in lumps 2 ft. long, the crusher should have a large bowl or hopper to receive the coke freely. It can be safely said that there is no first-class coke crusher on the market today available for electric-furnace requirements, which are:

1. Capacity, 5 tons per hour crushing to ¾-in. size.
2. Hopper large enough to receive lumps 2 ft. long.
3. Crushing surfaces should be made of manganese or chrome steel, easily detachable and open to inspection. Cast iron is too soft for wearing parts.
4. Crusher must have safety device, so that scrap iron in the coke can do no serious damage.
5. Bearings should be large and dust proof.

The most popular type of coarse crusher in present use is a vertical rotary pot crusher.

After crushing to ¾-in. size or smaller, the coke is passed to a vertical emery mill and ground to 30 mesh. As emery mills are prone to cause heavy bills for skilled labor or repairs, it would seem advisable to insert a small set of rolls, with chrome steel faces, between the coke crusher and the emery mill to reduce coke from ¾-in. to ¼-in. size. It would also seem that a small ball mill might be tried advantageously in place of an emery mill.

(b) Crushing anthracite coal for graphite manufacture.—Preliminary crushing is usually done by double rolls; the upper set, of toothed pattern 25 in. dia. by 20 in. face, running at 500 revolutions; the lower set corrugated, 24 in. dia. by 18 in. face, running at 250 revolutions. As in the case of coke, capacity should be 4 to 5 tons per hour, to facilitate unloading of cars. From the rolls, the coal, reduced to ½-in. size, is carried to a vertical emery mill and ground to 40 mesh.

(c) Crushing for carbide plants.—A vertical rotary pot crusher, similar to that used for coke, of 4 tons per hour capacity, followed by a vertical emery mill, makes an excellent combination. A jaw crusher of the Blake type may also be used in place of the pot crusher.

Elevating and Conveying Machinery.—Owing to the intense temperature used in electric furnaces, special mixtures of refractory and non-conducting materials (varying according to the particular purpose for which they are used) are made for furnace lining, and for packing material around carbon electrodes which are to be graphitized. At the termination of the furnace run the lumps of the partially converted material, usually containing abrasive crystals, must be returned to the raw-material building to be screened for further use in the furnace room. The furnace lumps are easily broken by a disintegrator (either rolls or a Williams pulverizer). The ordinary screw or worm conveyors do not wear well; the hanger bearings, submerged in the conveyor trough and full of material, are quickly cut out by the abrasive coke or carborundum. The best device for these materials and for raw glass sand is a reciprocating conveyor, working in a concrete trough moulded in a wooden box. The conveyor consists of cast-iron paddles, fastened by U-bolts to a pipe shaft and driven by a crank at one end. In this type the cement trough is practically indestructible; there are no bearings working in the abrasive materials. A broken paddle can be renewed in two minutes and at a trifling cost. The ordinary elevator of the malleable interlocking chain type does not work well, owing to the joints filling with material and quickly wearing out. It is better to cool the material enough so that it can be elevated by buckets on a leather belt.

Mixing and Weighing Machinery.—For making mixtures for carbide, carborundum, siloxicon or furnace lining, horizontal rotary mixers of the Rockwell or Dunning type are used. Both these consist of cast-iron troughs, in which rotate toward each other two shafts carrying paddles or scrolls. A weighing hopper is suspended above the mixer and proper charges are run into it from storage bins of lime, sand or coke. The mixers and all machinery in the raw-material room are usually run at sufficient speed during daytime to render night shifts of labor unnecessary. All the machinery is best operated by induction motors. It is best to have these with a large reserve capacity, as the dust renders them liable to overheating. Graphite dust in particular being a good conductor, causes much trouble. Specifications for elevators and conveyors should call for dust-tight casings. By securing large-capacity motors, and by connecting them by air pipes with a source of clean air for ventilation, troubles from overheating and short-circuiting can be lessened. A system of compressed-air piping is desirable for use in cleaning dust from motors.

To lessen the possibility of a shut-down

due to shortage of coke (from strikes or railroad blockades), as well as to avoid night shifts, large storage bins are a necessity in electric-furnace plants. Much skill can be exercised in design of such bins to secure efficient discharge of material without plugging the conveyors which drain them.

Furnace Rooms.—This part of an electric-furnace plant resembles, in many ways, an iron foundry. The travelling cranes running overhead with charges from storage bins for the furnaces; busy, grimy laborers building up or tearing down furnaces; the heat, gas and dust; the occasional outburst of flame from a thin spot in a furnace covering; all these make it a striking sight to a novice. The furnace rooms are yet crude, as might be expected from industries which have so lately emerged from the phase of experiment. The finely powdered furnace charges and lining materials carry some occluded air, which (at the high temperature of the furnace) forms carbon monoxide; this escaping represents a loss of available energy, and exerts toxic effects on the operatives. In the future we may expect to see electric furnaces fulfilling the additional function of a gas-producer; the furnace enclosed in an air-tight hood and the carbon-monoxide gas, as fast as formed, aspirated off for fuel to a gas engine. It has been found, for instance, that 4 tons of carbon monoxide gas (CO) are given off from a 1,000-h.p. carborundum furnace in 24 hours. This gas has a calorific value of about 4,500 B. t u. per lb.; hence if 3 lb. of the gas be allowed per i. h. p. hour, we should have enough gas to supply fuel continuously to a 110-h.p. gas engine. This is equivalent to reducing the power cost of furnace about 10%. Such gas would be more valuable for heating purposes than for power; for electricity, even at the cheap cost prevailing in such an electrochemical center as Niagara Falls, cannot be economically used for heating. The kiln used in carborundum plants for firing briquettes would seem a natural field for utilization of the waste gas from the carborundum furnace. The alternating electric current, from a power company, is usually contracted for, on the basis of a continuous and uniform hourly consumption the year around, and is usually delivered at a high voltage, about 2,200 volts. A transformer changes the current to a single-phase current of 125 volts, assuring safety to operatives in furnace room.

As the electrical resistance of a furnace charge varies when the current is first turned on, owing to its continually increasing temperature, a steady load is secured by varying the voltage by the induction regulator used in connection with the transformer. The resistance soon becomes uniform, and the work of the transformer-room attendant becomes almost perfunctory.

Usually bus bars run from the transformer room through the furnace room parallel to the heads of the furnaces, about 7 in. above the floor. For each furnace one lead drops down to the front head of furnace, another runs in a duct under the furnace to rear end; this method giving clear head room for hooks of the travelling crane over the furnaces.

A substantial floor is an imperative necessity in the furnace room. Concrete tends to crack when hot material is thrown upon it. The best pavement is made by laying a 10-to-1 cement base, 4 in. thick, then 1 in. of sand, rolled hard and level, then vitrified paving brick laid on edge. Such a floor will wear well and material can be easily shoveled on it.

The retaining side walls of the furnaces are built either of brick or of concrete blocks. When the sectional area of a furnace varies from week to week, as in the case of different sizes of electrodes which are to be graphitized, brick are convenient as they are easily adjusted. When a furnace is running on a steady charge, from week to week (as in the case of converting pulverized anthracite coal to graphite), large concrete blocks, with iron lugs for attaching crane hooks, prove convenient and save labor.

Adjoining furnaces should be so spaced that 6-ft. alleys, for convenient access, remain between. The furnace building should be designed to be absolutely fireproof, well lighted and ventilated and to carry electric travelling cranes over the furnaces. The cranes should be equipped with induction motors, with large reserve capacity, as the commutators of direct-current motors are adversely affected by the furnace-room dust and heat. The crane track should be at least 20 ft. from floor to allow ample room over furnaces for crane buckets.

The roof of the furnace room should be equipped with skylights and monitors. The latter should be provided with windows, operated in a battery by an automatic opening device from below, in preference to iron louvers which cannot be regulated. All glass should be of wire reinforcements, and all sash of metal. The roof should be of tile or reinforced concrete. The transformer room should be shut off from the furnace room to protect the transformers from dust and gases.

The Packing and Shipping Room.—These resemble closely those of a cement or other milling plant. Tube mills, followed by an air separator process, are used to grind graphite down to 200 mesh.

General.—Electric-furnace plants require large expenditure in expensive equipment (as storage bins, pulverizing mills, transformers, electric motors, copper bus-bars, etc.) for a small output of manufactured product.

While the power for the furnaces can be purchased at a cheap rate per horsepower year, the furnaces being non-continuous and non-automatic, are expensive as regards labor.

Allowance must be made for heavy repairs on crushing and conveying machinery. Raw materials, as anthracite coal, coke, lime and sand cost from $3.50 to $6 per ton.

So much time and labor are consumed in building up furnace linings, charging materials, and allowing them to cool before the converted product can be removed, that the output of a furnace per week is small and the labor cost high.

Where a finished product commands less than $75 a ton, capital should be cautious about attempting to manufacture it by electric-furnace methods. Niagara Falls itself contains several imposing monuments, in brick and iron, which testify more to the zeal than to the discretion of investors and engineers in electrochemistry.

An Australian Ornamental Stone.*

J. E. Carne states that while engaged in geological surveys in the Rylstone district, New South Wales, his attention was attracted by a group of domed mountains near the towns of Rylstone, Lue and Barrigan. Examination proved them to be composed of a rare rock that is provisionally classed as nepheline ægirine. It possesses remarkably varied and handsome petrographic structure and color that make it highly suitable for ornamental purposes. Some polished specimens are exhibited in the Department of Mines Museum in Sydney. The rock works well and takes a good polish.

The nearest nepheline mountain occurs within about five miles of the Mudgee railroad. The rock is of igneous origin, and occurs in huge bulbous masses, geologically known as "laccoliths" or "laccolites," which have not risen to the surface (like ordinary volcanoes), but have accumulated beneath it, thereby lifting the rocks above them into dome-shaped forms, corresponding to that of the intrusive material. Denudation has since removed the superincumbent rocks and exposed the present outlines, though inclined masses of the cover-rock still remain on the shoulders of the mountain. These rocks intrude the coal measures and uplift the Hawksbury (or Sydney) sandstones, which overlie them.

Electrical underground haulage systems are being installed at several mines. Such a system has been in use at mines of the Menominee and Vermilion ranges and in the Michigan copper country for some time and has proved its worth. Long electrical haulage is under consideraton at this time at some of the Oliver Iron Mining Co.'s properties on the Mesabi Range, and is to be adopted at once. Electrical haulage will also be installed at other mines of the Marquette and Menominee ranges.

**Annual Report*, Department of Mines, New South Wales, 1904.

Progress at Broken Hill.

During the past year (1904) Broken Hill experienced a high degree of prosperity, and the output from the different mines increased to 1,342,506 tons, a total that was not often exceeded in the most prosperous days of the field. In addition to this great production, all the prominent mines were re-opened, and a considerable impetus was given to prospecting the numerous lead and copper deposits within a radius of 30 miles of the Barrier. As a result of this activity, employment was found for a large number of miners; every class of business in the district benefited. This prosperity was all the more remarkable, as it came quite unexpectedly and after a period of unusual dullness that had existed during the previous five or six years, when serious droughts disorganized everything and crippled the water supplies of the mines and mills. The welcome improvement in general conditions was not due so much to the appreciable increase in the values of silver, lead and zinc as to the important advances in the treatment of the Barrier sulphides furnished by local metallurgists. The new processes they have introduced not only extract greater values from the ores, but they enable the immense heaps of tailing that have accumulated since the early days to be turned to profitable account.

The Proprietary Mine.—During the year this mine exceeded its 1903 output of ore by 59,381 tons. According to a recently issued report by Messrs. Godfrey and Carthew, Government inspectors of mines at Broken Hill, this great mine also established a record in handling ore. During one shift of 8 hours, as much as 1,636 tons of ore were raised. The average daily output maintained during the year was 1,726 tons.

Development operations were vigorously and systematically carried out. Delprat's shaft was sunk to the 1,020-ft. level, and was connected with the 800- and 1,000-ft. levels. The ore from these levels is now entirely hauled from this shaft.

The heavy, blocky ground in the 650-ft. level in block 12 (which formerly caused so many difficulties in working) is now worked by the crosscut system of stoping with the satisfactory result that, since this method has been adopted, no serious trouble has been experienced.

The new orebody (discovered the previous year in the 800-ft. level in block 11 by means of the diamond drill) opened up well and yielded good ore.

Although no traces of the destructive fire (that destroyed the timbering in 1902 and caused loss of life) were noticeable, the management considered it necessary to improve the ventilation by installing a large Capell fan, with a capacity of 80,000 cu. ft. of air per min. In addition to this, a new condensing plant, three ball-mills, several electric motors, steam superheaters, automatic chain-grate stokers and numerous smaller appliances were added to the company's plant, which now is ranked with the most modern and efficient mining plants in existence.

The metallurgical plant underwent an extensive overhauling; it was increased by new appliances (for the treatment of the zinc concentrates by the salt-cake process), which now have a capacity of 3,500 tons weekly, two new chambers for the manufacture of sulphuric acid by the Carmichael-Bradford process, and the necessary Gay-Lussac and Glover towers. The works are now turning out about 470 tons of chamber acid per annum, which is used at the mine for the manufacture of salt-cake for the treatment of zinc.

The equipment of block 10 mine was also greatly improved. The old mill (which for years stood on the lode outcrop) was dismantled; a new mill was erected on ground, not liable to be damaged by earth-slips, about 2,000 ft. away from Harvey's shaft. The ore is now conveyed to the mill by aerial buckets working on an automatic system, with a capacity of 75 tons per hour; this was installed by Pohlig, of Cologne, Germany.

The new mill is electrically driven, and is divided into four sections, so that, whenever the necessity arises, any section can be operated as a separate unit. Provision is also made for the storage of large quantities of ore in the bins to enable the mill to continue running in the event of the derangement of the wire-rope tram system at any time.

Power is supplied by three sets of turbo-generators, working at an initial steam pressure of 150 lb. per sq. in. Each generator works at a speed of 3,000 revolutions per minute, and is capable of generating 240 brake-h.p. The turbines are of the Parsons type, and were built in Switzerland.

A new winding plant, erected on Harvey's shaft, consist of two 6-ft. rope drums, driven by a direct-acting twin tandem compound engine. A feature of this engine is its automatic-compounding device. When the engine starts from rest, the boiler steam, at 150 lb. pressure, has free entry to the low-pressure cylinders; it works as a simple engine. But whenever a speed of 80 revolutions per minute is attained, a governor automatically cuts off the steam from the low-pressure cylinders and turns it into the high-pressure cylinders; the engine then acts in its compound capacity so long as the speed of the drum remains above 80 rev, per minute.

The Central Mine.—All troubles caused by the creep have been overcome; the past year's returns show an increase of 60,000 tons over those of the previous year, and the present prospects of the mine are so excellent that the company has set aside a considerable amount of capital for improvements.

Already the magnetic plant has been increased to a capacity of 1,200 tons of jig tailing per week. During 1903 the magnetic concentrators treated 44,093 tons of middle product with a yield of 22,838 tons of zinc concentrate. The success of this plant is such that its cost has been already more than trebly repaid. In addition to the magnetic experiments, the engineers on the Central staff have been experimenting with a new process of oil-concentration which is claimed to effect almost a complete recovery of metals, not only from crude sulphide, but also from by-products. Trials on a commercial basis having proven satisfactory, a plant with a daily capacity of 100 tons was erected and is now in operation.

The ore is at present drawn from the stopes in the 800-ft. level, but a new ore-chute discovered during 1904 in the 1,000-ft. level will be thoroughly developed during the present year.

The South Mine.—This is in a satisfactory condition. The orebodies are opening up well, and the prosperity of the company is assured for many years. In addition to over 600,000 tons of valuable by-products lying on the surface, there are exposed in the workings over 1,500,000 tons of ore which will average about 9.17 oz. silver, 16.56% lead and 16.93 zinc per ton.

Considerable additions were made to the plant during the year, these including a new winding engine, workshops, a milling machine and a new concentrating plant with a capacity of 6,000 tons per week.

The new main shaft, which is 12 ft. 10 in. by 9 ft. 6 in. clear of timber, is being carried down rapidly. In the main workings great attention is now given to the filling of the stopes with a view of obviating any further trouble from creeps. As a result of recent work in this direction, the mine can now boast of being one of the best filled on the field.

The workings in this property, the South mine, are now so extensive as to cause considerable trouble in following developments from the plans, which are so complicated as to confuse many. Recognizing this the manager is having complete models constructed on a large scale which will be placed in prominent positions so that any one connected with the mine can easily become acquainted with any part of the workings.

Good progress is being made in the British, Junction, South Blocks and Consols mines.

The Junction North Mine.—This mine (which was unproductive for some years) now promises to yield well again. A new body of high-grade ore was discovered some time ago in a crosscut running north from the 1,137-ft. level, and recent advances in metallurgical processes will enable the large bodies of medium-grade ore (that have been opened up for many years) to be turned to account. Previously, this ore (which is composed of a

high percentage of zinc mixed with garnet-sandstone and rhodonite, as well as lead and silver) could not be treated by the usual milling processes.

The Pinnacles Mine.—This is situated 30 miles west of the Barrier, has been taken over by the Queensland Smelting Co., and will be vigorously developed. This mine contains a ledge 8 ft. in width, carrying good values. A new mill is in course of construction, and it is expected that this property will shortly become a regular producer.

Static Electricity in Ore Dressing.

BY W. G. SWART.*

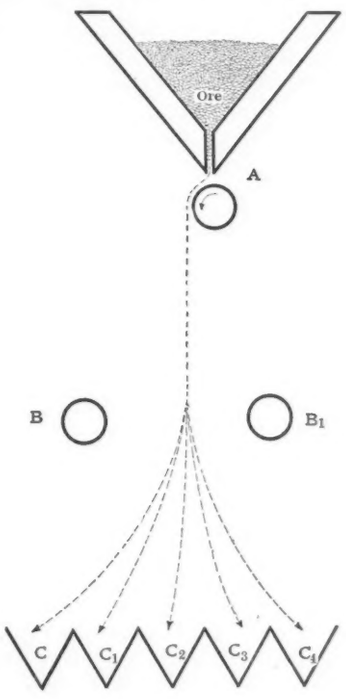
After nearly five years of successful operation, it seems to be pretty generally conceded that the electrostatic ore separator can be counted as being past the experimental stage and among the safe resources of the ore-dressing fraternity. This is true, at least, of the Blake-Morscher machine, of which more than forty are in operation. When this machine was first introduced commercially, its use was largely confined to those ores whose constituent particles differed widely from another in conductivity. However (due chiefly to the conservative attitude of the company owning the Blake-Morscher patents), it does not appear to be widely known that it has not confined its operations to the use of conductivity; it has developed other processes and other machines which take advantage, for the purposes of separation, of other electrical properties of matter. It seems only fair to state this in view of the number of workers who are beginning to turn their attention to this field. Machines have been developed in which the electrostatic capacity of the ore particles has been made to play an important rôle; but perhaps the most interesting of these processes (developed and in use by this company) is that depending for its operation on the specific inductivity of various materials. In its simplest form (referring to the accompanying sketch) the apparatus now in use consists of a hopper and feeding device (A); charged poles (B) and (B_1); and receptacles (C), (C_1), (C_2) and (C_3).

The poles (B) and (B_1) are usually highly charged with electricity of opposite sign, but not necessarily of the same potential. When a stream of ore particles is dropped through the field between the two poles, the particles are urged out of their original path and into different directions, with varying degrees of force, depending on differences in their specific inductivity; the several minerals fall, each into its own receptacle at the bottom. Nothing could be much simpler, yet the thing is positive, and the results are remarkable.

With such an apparatus it is possible to separate substances independently of their conductivity. For example, to take materials of approximately equal conductivity, fluorite may be separated from quartz or barite; barite from blende; feldspar from corundum, etc.

It must be evident that this enormously widens the field of the electrostatic process; and, when taken in connection with conductivity separations (where the conductivity is either natural or produced artificially), it gives a range covering almost all known minerals.

The electrostatic generator has also been made closely to approximate the dynamo in reliability. The machine of the laboratory or of the physician, running uncertainly a few moments at a time, has given place to mechanically strong and powerful mica-plate generators, running con-



tinuously night and day, in damp and dusty mills, with ordinary help.

As now used by the Blake company, all brushes and other moving contacts are abandoned; the field plates are in static shunt with the generating rotors, so that the machines are self-exciting. The ozone and nitrogen compounds which are continuously formed are removed as fast as generated by a forced draft of hot, dry air, which also prevents all moisture deposits, so that the machines are now independent of atmosphere or altitude.

In filling around bee-hive coke ovens, care should be taken to have the material next to the crown of such a nature that it will form a crust when the oven is fired. When it bakes hard, it should form an arch over the oven and support the remaining filling material. It is essential that all stones larger than gravel should be excluded from filling material next to the oven brick.

*Superintendent of the Blake Mining & Milling Co., of Denver, Colo.

Mining at the Lewis and Clark Exposition.

SPECIAL CORRESPONDENCE.

California.—This exhibit, in its State building, comprises gold with massive specimens of quartz from such mines as the Maryland and the Empire and the Grass Valley. One cabinet is filled with gold specimens from the State in general. A "cemented" specimen of gold with gravel is unique. Gold gravel from ancient river channels with sand from dredgers are attractively displayed. Two cases are filled with specimens of massive copper sulphides, with like samples of chalcopyrite and associated minerals. Two cabinets are filled with choice specimens of cinnabar. One large specimen of sulphur is shown from Sunset, Kern county.

Probably the finest kieselguhr in the world is that from Lompoc, Santa Barbara county. It is in demend for fireproof building purposes, for packing, as an abrasive, for absorbing nitro-glycerine and other explosives, and as a combination in certain wall plasters. A block, about a ft. cubed, is on exhibition. One handsome specimen of orbicular diorite, polished, is worthy of note, as also the fine display of slate from the Eureka quarries, Eldorado county. Handsome decorative tiling is shown from Tropico, Los Angeles county. Ores of zinc and lead are exhibited in one small case. Massive specimens of iron ores appear from the State's deposits; with chromite from Willows, Colusa county. Niter (crude saltpeter) is exhibited from Death Valley, San Bernardino county. One stand of oval-shaped coal briquettes from the Tesla Coal Company, Stockton, resembles certain brands of tar-soap in appearance. Table salt is exhibited by the Western Salt Company, San Diego county. The mineral waters of Shasta, Whittier, Bartlett, Cooks, Napa, Martinez and Alhambra make up an aqueous exhibit. The world-famed lepidolite with rubellite and amblygonite (white, carrying about 8% lithia, and over 40% phosphorus pentoxide), from near Pala, both appear in one cabinet. Crude and refined oils are shown. The Pacific Coast Borax Company has a fine exhibit.

Structural Material.—Under this is shown an elaborate display; pressed brick from Los Angeles; brick from the Carnegie Brick Company; glazed brick from Gladdings, McBean & Co., San Francisco; granites, magnesite from the American Magnesite Company and the Western Carbonic Acid Gas Company; gypsum from Santa Barbara county; limestone from Kern county; and asphalt from Summerland, Santa Barbara county; asbestos (much of it amphibole) from Georgetown, Eldorado county, and quartz crystals.

The Pacific Stone Company shows plain and ornamental stone, with concrete building blocks by Marshall Brothers. A

pyramid of jars containing clay, cement, limestone, gypsum, kaolin, mineral paint, sandstone, etc., shows up well.

Mining and Oil Appliances.—F. W. Braun & Company, of San Francisco and Los Angeles, exhibit muffle-furnaces, crushers, pulverizers, cupel machines, etc.; wire-ropes and steel cables by the American Steel & Wire Company, of San Francisco; and models of the Rush oil-burner system; centrifugal pumps by G. W. Price & Company, San Francisco.

A handsome display of transparent photographs, showing mining students at work in the mining school and in the field, is exhibited by the State university, at Berkeley. A large bromide of the Empire mine, Grass Valley, and numerous views of mining scenes throughout the State make up the photographic collection.

San Diego county is foremost in its display of collections, including lepidolite, amblygonite and kunzite, the distinctive gem of California, "a white lilac-colored spodumene."

Tourmaline is shown from Pala, chiefly black; also some fine specimens of green and pink varieties.

Alamandine and spessartite garnet are shown from southern California; topaz and brilliant beryl; sapphires are yet to be authentically located; cairngorm (smoky quartz) occurs in large crystals.

Idaho.—Fred. C. Bradley, commissioner of mineral exhibit, can well be proud of his collection, especially in lead ores (cerussite and galenite). This is situated in the southwest corner of the building, and contains specimens of gold, silver, lead, copper, cobalt, nickel, tin, antimony, zinc, sulphur, asbestos, garnet and opal, from eighteen of the twenty-one counties of the State.

Utah.—Utah shows up well. It is admitted that the State possesses the finest beds of gypsum (some anhydrite) and the purest of all in the United States. Its giant selenite-gypsum is well known. The salt (sodium chloride) exhibit is good. A luminous zinc-blende was given as "hell-fire ores. Ores of uranium and vanadium, diffuse and massive, are well shown in a cabinet. Many fine specimens of the ores of iron, copper, lead, silver and gold are prominently displayed, as also is coal. A novel concentrating plant is part of the exhibit. Utah's hydrocarbons (ozocerite, elaterite, gilsonite and others) are in quantity.

Nevada.—Notwithstanding the known deposits of wolframite, hübnerite, manganese ores, niter, cinnabar, ores of copper and the many minerals of commerce which occur in the State, but twenty-four samples appear.

Colorado.—Much might be said of the handsome and valuable collection from this State; for instance, the noted wire-gold from the slates of the Wire-Patch mine and the Victoria, of John Campion's, near Breckenridge. In Colorado is found yellow carnotite (uranium oxide and that of vanadium). The finest pitch-blende occurs in Gilpin county. Wire-silver, other ores of silver, those of lead, copper and so on, are shown in quantity. Speaking of tellurides, the State is in evidence, especially in calaverite and other tellurium ores of Cripple Creek. Iron ore and coal, sulphur, molybdenite, bismuth and hydrocarbons are also shown.

Oregon.—F. R. Mellis is the superintendent of the Oregon exhibit. Naturally, one expects much in the way of a show of mineral resources. The collection is mammoth and typical. Some molybdenite is located in the Imnaha mountains. There are 50 samples of ore resembling chalcopyrite, which samples weigh from ½ to 5 oz. each and average 50% metallic gold, from the North Pole mine, near Sumpter. From the Standard Consolidated Gold Mine Co. are mammoth specimens of tin-white cobalt ore carrying 8.63% cobalt and 1.64% copper, with 7.05 oz. gold per ton. William B. Dennis has a magnificent display of the low-grade ores of mercury as found at the Black Butte quicksilver mines. With the exhibit is a testing plant for the reduction of such ores. The State deserves great praise for its handsome showing.

Arizona.—In the Forestry Building, located in one of the galleries, there is a small showing of minerals, not characteristic of this great mining territory. The collection comprises a few ores of copper and some silicified wood.

Montana.—Prof. A. N. Winchell is in charge of the exhibit; the collection is full and complete: specimens of nugget and other native gold, with much gold quartz; beautiful, massive covellite, chrysocolla, malachite, cuprite, chalcopyrite, chalcocite and other ores of copper. The B. & M. Copper Co. has on exhibit two columns of copper in wire-bars, weighing 155 lb. each. Prof. Winchell states that some pyrolusite is found in and around Butte. There are quantities of gypsum. In Park county, near Yellowstone, it is said large deposits of calcium tungstate are found. Near Dillon crystallized graphite occurs in quantities, and, likewise, molybdenite.

Wyoming. The State has made a good exhibit. For care in collecting, method of display and correctness of specimens labeled, no State surpasses this. Here is found high-grade hematite from the Sunrise mine (C. F. & I. Co.); some of this was used in painting the first Brooklyn bridge. The Rawlins variety carries 94.22% iron peroxide, no titanic acid, and but a trace of phosphorus. Guernsey, Hartville and Rawlins have furnished many thousands of tons of iron ore to the Salt Lake and Denver smelters for flux in copper and lead smelting.

In coal mining the State produces approximately 5,000,000 tons of lignite and long-flamed bituminous coal per annum; this is its chief industry. Copper, however, may soon take the lead. On exhibit is steam-tin from Crook county. From the Grand Encampment district high-grade copper ore is obtained. Platinum has been found in the Rambler ores, occurring in the covellite (indigo copper) and showing 1.4 oz. of platinum per ton ore. Other products are natural gas, bituminous shale, volcanic ash, graphite (40 to 60% carbon), asphaltum, manganese ores, epsom salts (in small quantities, native), gypsum, building stone and plaster of paris. Clays for common and pressed brick, terra cotta, tile, fire and potter's clay were exhibited. Bentonite (soap clay) is found at Rock creek, Albany county. This is used in making paper and in the manufacture of antiphlogistine. Salt is produced near Cambria. Glass quartz is found in the Laramie mountains. Glass-sand is obtained from the beds of Laramie. "Book-mica" has been located. Feldspar occurs in Whalen cañon. Jelm mountain yields bismuth (carbonate and metallic) ore yielding from 50 to 60% metal. Sulphur is found in extensive deposits at and above Cody. Native alum occurs in Big Horn county. Near Wheatland is fibrous talc.

In semi-precious stones, Wyoming produces massive white moss-agate, near Guernsey; also quartz crystals, agates, petrified wood, beryl and garnet. Asbestos (both amphibole and chrysotile) is found at many localities; in the Seminole mountains the latter variety occurs in commercial quantity. A cabinet of sodium carbonate is a prominent exhibit, as also the fossil fish of Dr. Gamble, Diamondville; a large geode of crystallized quartz from a petrified tree, as also the special species of dinosaur.

The State exhibit of oils is well displayed. A fine white lithographic stone is said to occur in the Big Horn mountains. The onyx display from Uinta county is good. Sulphate of soda is found at Union Pacific lakes.

Washington.—This has one of the finest State buildings upon the grounds. The display of minerals is fine. The Tacoma smelter shows some chemically pure copper. The sulphides, carbonates, oxides, chlorides and silicates of many metals are shown in large, massive specimens.

Prof. Milnor Roberts, of the State University, is in charge of the mineral exhibit, assisted by J. W. Moody and R. A. Barry.

The United States Geological Survey, with its plant for the separation of platinum and other rare metals and minerals, is in charge of Dr. David T. Day. It is well to advise prospectors to forward 4 lb. of material for testing, and at no cost to the consignor. Postal franks for carrying the sample can be procured by addressing Dr. Day.

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THE HUNTINGTON-HEBERLEIN process, according to news report, has been put in operation at the works of the Sullivan Group Mining Co., Marysville, B. C., with satisfactory results. This is the second installation in North America, the first having been at Mapimi, Mexico.

Minimum Royalty Leases.

A decision, handed down recently by one of the Pennsylvania courts, regarding coal leases, is of importance to anthracite producers. For some time the Lehigh Valley Coal Company has not been working certain coal lands which are under minimum-royalty lease. The minimum annual payments accumulated until the aggregate paid in equaled the total estimated royalty on the remaining coal unmined on a property in question. The court decided that the Lehigh Valley Company should be held to the minimum-royalty clause in its lease of the property. Notwithstanding the fact that the property cannot be profitably worked at present, the royalty payments are to continue.

Gold-Slime Treatment.

A remarkable achievement in the metallurgy of gold, especially in the cyanide process, is the result of experiments on the treatment of slime that have lately been conducted at the works of the Homestake Mining Company, in South Dakota. It has been demonstrated, experimentally, on a practical scale, that the 1,600 tons of slime made daily by the mills of the Homestake Mining Company can be treated at a profit by cyanide extraction, although the slime assays only 50 cents to $1 per ton. This extraordinary promise is due to new methods and apparatus, which have been devised by Mr. Chas. W. Merrill, metallurgical engineer for the company, who is well known as one of the leading authorities on the cyanide process. We understand that the Homestake Mining Company is to instal equipment for slime treatment by the new system as soon as the plans and specifications can be completed.

Calumet & Hecla.

The by-laws authorizing the directors of the Calumet & Hecla to purchase stock of other corporations with the company's funds was approved by the stockholders at their recent annual meeting. We referred to this action at the time it was proposed. The immediate object is to enable the company to buy and hold the stocks of two new concerns, organized to work on a tract of 60,000 acres of land on Keweenaw Point, which has been acquired for the benefit of the Calumet & Hecla company. The operations proposed present about the same chances of success as are found in several other locations in the district which are now being exploited. There is no doubt that the property has been thoroughly investigated by the company's experts, and that the opportunities are considered good. The more important point is, that the action now taken is a departure from the company's traditional policy, undertaken for reasons not explained, but much discussed by outsiders. Time will disclose them, without doubt.

Mining Stock Exchanges.

The Los Angeles Western Mining Stock Exchange has suspended for lack of business. It became hardly worth while to call the list, so few were the transactions. The fact is that few of the big producing mining companies on the Pacific Coast have any interest in stock quotations, and not many of them are listed. This is particularly true of California properties. Most of the trading is therefore in stocks of mines being opened or developed where capital is needed, and the fluctuations of the stock have little or no relation to actual changes in the condition of the mines themselves.

Times have indeed changed from the days when the Comstock shares were noteworthy gambling attractions. There are still many local mining stock exchanges in the United States, but in no case do they engage serious attention outside of their own cities, and not much even there, with one or two exceptions. The Boston Stock Exchange and the New York curb market are the only active speculative centers in mining stock transactions.

Advance in Anthracite Mining.

The idea is frequently expressed that anthracite mining methods have remained stationary during the last quarter of a century, in which time the preparation of coal has witnessed many changes. Many important improvements have been effected in that time, however, among which those introduced by John Veith

are noteworthy. Mr. Veith was for many years the general inside-mine superintendent of the Philadelphia & Reading Coal & Iron Co. He has lately retired from active mining practice, and is retained by the Reading company in an advisory capacity.

The improvements referred to include the system of working a certain number of breasts to their limit, and leaving unmined pillars (about two breasts wide) on either side. These temporary barriers frequently confine a squeeze to a small section, which can also be isolated in case of fire. Possibly of equal benefit to successful mining, is planning the pillars in one seam, so that they come directly over those in other seams immediately below. Sufficiently large gangway stumps for breasts are also important. These improvements, so generally adopted today in the best anthracite practice, are the outcome of years of experience of one of the principal figures connected with the development of the Reading coal properties.

The Mining-Geologist.

There is one paragraph in Mr. Brunton's highly valuable and eminently practical paper which is especially worthy of comment. This is the one in which he recommends the employment, by every company operating large mines, of a mining-geologist whose duty should be to study geological evidence as presented in the development of the mine. Such evidence may be overlooked by the hard-worked superintendent and his assistants of the executive staff. We may say, without doubt, that it is generally overlooked, not entirely, but sufficiently to permit numerous phenomena to escape notice; it may be that certain of the unobserved or non-recorded facts, possibly of trivial appearance to the inexpert, would prove precisely the missing link in the chain of evidence upon which some scheme of exploration ought to be based.

If a competent man were employed to attend to that work, and nothing else, the chances are that the facts will be thoroughly observed and the evidence noted. There is at least one large American mining company which has adopted this policy. We have no doubt at all that its idea will be imitated. It is particularly interesting as exemplifying the reduction of a pure science to the most practical possible application. We had first the geologist, pure and simple. Then we had the economic geologist, the specialist in ore deposits. Now we go a step further and have the mining-geologist—possibly he will call himself the geological engineer, a designation to which he would have good title, though "mining-geologist" is preferable.

The Copper Situation.

The domestic copper market is almost bare of supplies, and it is difficult to obtain metal in any considerable quantity for prompt delivery. The reduction in the stock of copper has been due chiefly to the active demand for domestic consumption and to the extraordinary demand from China, which was for a long time unexplained.

It was early suggested that this Chinese demand was chiefly for coinage purposes, but it was difficult to believe that so large a quantity of copper as was exported to China could be required for such a purpose, and there was a suspicion that the Chinese demand was connected with the requirements of the combatants in the war.

The war has probably had a good deal to do with the situation in the copper market, so far as the East is concerned, but nevertheless it is now well known that the chief factor in the Chinese demand has been for coinage requirement. In this connection it is interesting to note that when copper was at its high point, a few years ago, supported by the Amalgamated Copper Company, there were considerable imports of coin from the East for remelting into ingots.

With respect to the recent demand from China, that country has heretofore had a copper coin, or "cash," equivalent in value to about one-twentieth of a cent American currency, which has been the chief coin in circulation. Recently there has been an extensive mintage of a new coin called the "cent," of increased weight and value. The requisitions for this purpose by the viceroys of all the provinces of China have in the aggregate called for a large quantity of copper.

The Geological Survey.

An organization of the magnitude and ramifications of the United States Geological Survey, from time to time, will, incidentally, meet with criticism. We ourselves have had occasions to criticize its performance of certain work. Those criticisms have been, however, with a view only to effect improvement, and have not indicated any lack of appreciation of the great value to the mining industry of the chief work of the Survey. The Survey established its reputation under the great directors of its early history, and that reputation has been well maintained by their successors. An organization which early gave the profession so valuable a monograph in economic geology as that of Emmons on Leadville, and whose members have done more perhaps than any other body of professional men to establish the science of economic geology, will not easily lose esteem.

The work that is being prosecuted by the Geological Survey during the present summer is of unusual scope, and will be of remarkable value to the mining industry when its results are published. We have recently had occasion to commend many of the new publications, especially the greater promptness with which they are now given to the public. Tardiness in publication was a chief criticism in former years. The new year-book on "Economic Geology," which has now been published for three successive years, is especially valuable. Another example of high-class and eminently timely work is the recent report of Mr. Purington on Placer Mining in Alaska, which we have already remarked in these columns as a fine exemplification of the practical assistance that the Survey can, and does, render to the mining industry.

Referring to a minor matter, we consider the publication of the monographs of the Survey in its recent 6 by 9-in. size a great improvement on the old size of 9 by 11½ in., and we regret that the latter has not yet been entirely abandoned.

Conditions in the Transvaal.

The gold output of the Transvaal in July was the largest on record, amounting to $8,673,000, or at the rate of over $100,000,000 a year. Apparently the maximum has not yet been reached, and it is expected that the remaining months of this year will show still further gains. It is probable that the monthly production may exceed $9,000,000 by December; but local authorities doubt whether it will go beyond that point, at least until some of the newer deep-level mines begin to add to the returns. By that time, however, it is likely that several of the older outcrop mines will drop out of the producing list. It is well known that some of them are nearly approaching exhaustion.

The labor question is not altogether settled. The available Kaffir labor does not increase; the latest returns, indeed, show a decrease in the number employed. There is a good deal of other work still going on, which the Kaffir finds more attractive and often better paid than labor in the mines.

There are now over 40,000 Chinese in the mines of the Witwatersrand, and they are still coming. They seem to be generally well organized and fairly steady, though there have been several outbreaks among them, which indicate that the Chinaman is not quite as peaceable and docile as he has credit for being. The management of 40,000 laborers—it will soon be 50,000 or 60,000—of a race wholly alien to, and not easily understood by, the white managers is not an easy task. Some trouble was to be expected, and that difficulties have, so far, been few is an encouraging feature. The rapid increase in number and the tendency of the Chinaman to secret organization in a way, and for reasons, impenetrable to his white masters, point, however, to possible serious difficulties in the future.

Reverberatory Furnaces in Copper Smelting.

The success of the huge reverberatory furnaces at the Washoe works of the Amalgamated Copper Company has directed new attention to this method of smelting, which recently has been rather disregarded in the concentration upon pyrite smelting and the development of the large blast-furnaces. Up to a year or two ago the reverberatory furnace was still a rather small affair, when compared with the modern blast-furnace in point of tonnage of material smelted. In the new Washoe furnaces, however, the capacity of the reverberatory was increased at one jump from about 150 tons per day, the maximum of the furnaces previously in use, to upward of 300 tons per day. The latter figure puts the reverberatory on practically even terms with the ordinary, modern blast-furnace in so far as tonnage is concerned. The disturbing effect of the intermittent charging of the reverberatory has, moreover, been materially lessened. The process has, in fact, become almost a continuous one and is now really analogous to that of the blast-furnace if we imagine the latter turned over on its side.

It is found practically in the new reverberatories that the consumption of fuel per ton of ore is much reduced, the combustion of the great mass of coal on the huge grates of their fireplaces minimizing the atmospheric interference during the periods of stoking and grating. The conditions of combustion become indeed approximately the same as obtain in gas firing, one of the advantages of which is the use of the minimum quantity of air. Economy in coal is, moreover, effected by the ability to generate steam from the waste heat of the furnaces, and also to recover unburned coal from the gratings. The result of these economies is to reduce the coal cost in reverberatory smelting to approximately the same figure as the coke cost in blast-furnace smelting. The reverberatory process is, moreover, unified by the efficiency of the modern methods of roasting the ore, which can be effected as low as 25 cents per ton, the hot calcines being transferred directly to the smelting furnace, and thereby contributing to the economy of coal.

At the present time there is not necessarily any great difference between the cost of smelting in the reverberatory and in the blast furnace. Under certain conditions the former may be the cheaper; under other conditions, the latter. There will be an increasing tendency toward the reverberatory process, as the low-grade ores, requiring concentration, are more and more worked, the concentrate being especially adapted to smelting in the reverberatory, whereas the contrary is the case in the blast furnace.

The tendency toward an increased use of the reverberatory furnace is manifested by the installations which are now being made in several works that are under construction.

Watering Coal Dust in Mines.

An article on this subject elsewhere in this issue treats of a matter which has engaged the attention of colliery owners, mining engineers, managers and inspectors in Great Britain for the past quarter of a century. The opinions held regarding it are various. In some parts of the United Kingdom the system of watering long distances of entry has been abandoned as being of doubtful benefit. In other sections, many methods of treating coal dust (similar to that described in the article referred to) have been adopted. There are still other methods involving considerable expenditure in pipes.

Considering the thoroughness with which English commissions study matters of this kind, the admitted importance of the subject, and the various opinions held in regard to it, an investigation would be particularly appropriate. Great benefits were derived from the report of the committee of the North of England Institute of Mining and Mechanical Engineers "on flameless explosives" in 1896, the conclusions of this committee having been of much value in framing that part of the Coal-Mines Act relating to explosives. In this connection, the suggestion is timely that many of our American mining laws, in their framing, show a serious want of proper technical guidance.

Taken in connection with the conditions of coal mining of the present time in Great Britain, Germany, Belgium and other countries (where mining at great depth is under consideration), this matter of dust laying has a new interest. In deep mines, where high temperatures exist, the dust will naturally become dry; and means to render it harmless, which will add humidity to the mine atmosphere, would be of doubtful benefit. In Westphalian mines a moist atmosphere would also be conducive to the spread of ankylostomiasis. Moreover, it is questionable what advantage there is in a system of merely dampening the surface of a thick deposit of dust, over which a strong current of hot air may be passing. It would quickly dry out, and when stirred by men or animals, would be as dangerous as before. The only safety would be in constant treatment.

However, watering coal dust is extensively employed at present both in America and in Europe, and the system seems to have been successful in many instances. The usual practice in the United States has been to sprinkle only the bottom of roadways, disregarding the accumulations of dust on the sides and timbers. In some foreign countries there are experiment stations where investigations bearing on this subject can be pursued; it is a matter of regret that there are none in America. The frequent disasters, attributed to initial or secondary explosions of coal dust, point to the necessity for additional information as to some means of prevention. After learning how accidents may be best prevented, it will be practicable to enforce laws providing for the proper means.

Metallics.

By pouring the iron hot, light castings are less likely to take a sand chill.

When a steam pump valve has a rise of from 1-10 to ⅛ of its diameter it will give good results.

Roof slopes of ⅜ pitch and of 5-24 pitch are better than ⅓ and ⅕ pitch respectively, in that they are more readily computed.

The old cylinder type of cupola for iron foundries is usually made with the tuyere area about two or three times that of the blast pipe.

Care is necessary in the use of unusually high cupola temperatures for melting. The blast is apt to oxidize the iron and make it harder.

Composition valves on steam pumps wear better than rubber, but the latter make less noise and on that account are used on moderate pressures.

Oil can be used for electrical insulation under circumstances (such as extremely high potential work) where solid insulators would act almost like conductors.

The lost motion in the valve gear of a duplex pump may be reduced by fitting one or more thin iron washers on the valve rod between the nut and the lugs on valve.

Compressed air is usually used at from 65 to 100 lb. pressure. In torpedo practice, however, and in street-car work, pressures as high as 2,000 lb. per sq. in. are used.

Oil, as an electrical insulating medium, is of considerable value (owing to its higher dielectric strength as compared with air) for sealing cracks or openings in solid insulating material.

Water-cooled transformers are not, strictly speaking, correctly named. The transformer is immersed in oil (for insulation as well as for cooling), and the oil is cooled by the circulating water.

On raising the temperature of pure iron (alpha-ferrite) it passes at 765° C. into an allotropic form (beta-ferrite); and into another (gamma-ferrite) above 890°, in this last condition it is non-magnetic.

The radiating surface required for disposing of the heat generated in a large oil-insulated, air-cooled transformer limits the capacity for which this type can be built economically to about 500 kilowatts.

Soft rubber valves are used for steam pumps where the pressure carried is less than 40 lb.; above this pressure harder material is used, but above 75 lb. nothing but the hardest rubber (or a metal valve) will answer.

The fluidity of oil renders it of value as an insulating medium, for it offers practically the same resistance after an arcing discharge as before. The tendency to "drown," or smother the arc, is used in the modern oil-break switch.

A single-cylinder steam pump will sometimes come to a full stop if neglected, due usually to lost motion. The piston pauses slightly at the end of each stroke, and it sometimes occurs that the pause comes before the valve is actuated.

Aluminum, used as electrodes in electrochemistry, was found in dilute solutions of nitric acid to puncture. A series of extremely minute holes or pittings were found to extend clear through the plates after charging for eight hours with 8 amperes at 5 volts.

In the manipulation of thermite the reaction, as ordinarily carried out, produces about 50% of a mild form of steel containing about 0.1% of carbon derived from the graphite of the crucible. Nickel thermite is employed for the introduction of a definite quantity of nickel into cast iron or steel.

Tee-rails, spread out in fan shape with the intersecting ends resting on a pier and the spread ends on the walls of manholes, have been used with concrete for years in the streets of New York for supporting elevated railroad pillars. This particular form of concrete steel is one of the oldest known.

The oil-insulating, self-cooling transformer is cooled by means of the outside case which is designed with a large radiating surface. The form of case giving best satisfaction, and now used almost exclusively except for the smaller sizes, is made of sheet metal, corrugated to increase its area.

In machine-drilling, a good mineral cylinder oil should be used in the air chest; from there it passes into the cylinder. Feed in a small quantity at frequent intervals, and on a new drill use an excess of oil for the first few days, because the moving parts of a new machine fit tight and hold very little oil at one time.

Valve seats of pumps may be removed with a socket wrench made of steam-pipe of suitable diameter. Slots are filed across one end of the pipe, about ½ in. deep; these are to fit over the arms of the valve seat. The pipe is turned with the tongs or stillson wrench, or a cross piece may be permanently attached to it for the purpose.

When a duplex pump is obliged to run at a greater speed than originally intended, the water valves may be prevented from being lifted too high by placing one or more washers on the valve stud or guide over the valve; this will usually lessen the noise. This remedy has been applied to some badly overspeeded pumps with excellent results.

A slag high in iron runs fast, and is generally clean in both silver and lead, provided the lime percentage be not too low. A fast-running slag is not, however, necessarily profitable, since it may cause waste of valuable iron that should be employed to flux silicious ore. With a high percentage of zinc in the charge it is generally necessary to run a slag high in iron and low in silica.

When a drill-bit sticks in a hole, the usual remedy is to strike the shank violently with a sledge, until the bit is loosened. It is better to strike a moderate blow on the shank, near the hole, and never so high up as to strike the chuck, because then a bent piston or a broken chuck is likely to result. Small pieces of cast-iron, nuts, or other fragments are used to keep the drill straight and prevent sticking or "running off."

A pump valve need only lift ⅛ of its diameter to provide sufficient opening for the water. In globe, angle and other valves the valve must raise ¼ of its diameter in order to provide an opening through which the steam and water may escape as freely as through pipes connected to valves. This does not apply to pump valves, as they are always made much larger than the seats, and much space under the valve is occupied by the arms that form the spider of the valve seat.

Malachite, the green basic-carbonate of copper, contains 8.2% of water and 57.3% of copper. Azurite, the blue basic-carbonate, contains 5.2% of water and 55.1% of copper. These two minerals seem much alike in composition, but the green malachite is the more stable. A curious illustration of this was given by the late Geo. H. Williams, of Johns Hopkins, in his lectures in minerology. Often in old paintings the sky is represented as deep green. This is due to malachite, which, on the canvas, has resulted from the azurite which was used as a blue pigment when the picture was originally painted.

Regarding the temperature control of the muffle in asaying, certain rules are given by the various manuals, often with recommendations of definite temperatures for certain specific operations. But, as a matter of fact, only the most general rules can be given, and these must be modified by the assayer to suit the particular needs of the ore, and adapted to the condition and capacity of the furnace in question A good assayer must be a good fireman. He may give a cupel a low temperature start, gradually raising it or holding at a moderate heat, and closing with a touch of high temperature. But these are rules which cannot be definitely formulated for one who has but little actual experience; indeed the "rules" can be applied only by those furnished with long training and gifted with common sense. The good assayer is an artist, and there is no easy road to a mastery of the art.

Colliery Notes.

Gas escaping freely from pressure in coal seams should have a cooling effect on the air in extremely hot mines; in expanding it would absorb heat.

The Canadian Geological Survey is said to have done topographical surveying by photography at an expense of $4 per square mile, for field work alone.

According to William Clifford, in some coal mines 3,000 ft. deep, with well-designed furnaces, the ventilation economy should approach, if not reach, that effected by any of the modern fans.

A mixture of whitewash and alum, applied to timber in mines. decreases its inflammability. An occasional use of this mixture in spraying-water-cars for dampening coal dust, would have a beneficial effect on the timber.

Keeping tracks clean on haulage-ways in bituminous mines accomplishes a double purpose. The removal of the coal-dirt allows the mine cars to run with less friction, thus saving in power, and also tends to keep the air free from dust—an ever-possible source of danger from explosion.

The Auchincloss breaker of the Delaware, Lackawanna & Western Coal Department, in Pennsylvania, is run by independent motor drives. The motors are enclosed in sheet-iron cases to keep the coal dust from injuring them; furthermore, air from a fan is sent by pipes to each case, keeping the motors cool and creating a pressure against dust sitting in.

Ordinary domestic illuminating gas has a calorific power of from 600 to 650 B. t. u. per cu. ft., while some of the gas from coke ovens in Yorkshire, England, has been estimated at 460, and that at Whitwood has a calorific value of 550 B. t. u. Babcock & Wilcox boilers connected to bee-hive coke ovens have given 1.069 lb. of water, evaporated from and at 212° F., per lb. of coal coked.

The ventilation of deep coal mines is a serious problem. In a deep Belgian mine the maximum rock temperature is 113° and that of the air 103° F. It is considered, however, that rock temperatures of 120° or even 125° can be successfully dealt with by proper ventilation. With these high temperatures, a dry atmosphere will contribute greatly to the comfort of the miners, but make the dust problem difficult of solution.

A remarkable furnace ventilation plant is in operation at Murton colliery, Durham, England. The shaft is 1,494 ft. deep. The volume of air passing is about 500,000 cu. ft. per min. To rarify this large volume, 3 furnaces are used; and 27 boilers (employed for generating steam for haulage, pumping and other purposes) throw their heated products of combustion into this furnace shaft, greatly increasing the motive column.

The Delaware, Lackawanna & Western Coal Department expects to make use of the slate removed from the coal during preparation. This waste, which forms large banks around anthracite mines, is to be broken down to pea size and under, and flushed into old mine workings. Thus by sending this slate through rock rolls, a double benefit will accrue; the slate goes into the mines out of sight, and it also assists in holding up the surface.

Among the Lehigh Valley coal storage plants now under construction and nearing completion are the following which represent the three existing types: The Ranson, or flat, storage plant; the side-hill plant at Black creek; and the Buffalo covered plant for storage and reloading box-cars. These three plants will have an aggregate capacity of 1,000,000 tons of coal. The Ranson plant is an unusually large one; it provides for the storage of 400,000 tons and contains some novel features. It was designed by R. V. Norris, of Wilkes-Barre.

An electrical firm doing a large amount of mining work states that electrical hoisting would not be economical for plants requiring above 1,000 h.p. as a maximum at the end of the acceleration period. An instance is given of a colliery requiring to raise 2,500 tons a day from two shafts, each 2,190 ft. deep. The power required at the maximum acceleration is 5,500 h.p., and the plant requires two 1,300-k.w. generators and a motor generator set capable of working up to 5,000 k.w. The cost of the plant was £48,000, while that for steam hoisting was only £12,000.

The best mine furnace-ventilation practice in Great Britain is as follows: Over the space intended to enclose the furnace, a large arch is constructed, within which is built a central arch for the grate and furnace proper, and two side arches for the purpose of firing and cleaning the rear end of the furnace. Furnaces are sometimes 50 ft. in length (of grate bars) by 10 ft. wide. These arches are usually backed overhead, next to the stratum, with sand. Adjustable iron doors at the front, and a firebrick-lined drift to the shaft at the rear, complete the equipment.

Hydrocarbon oils have a strong affinity for carbon. Experiments with oil concentration on coal-dust showed that a pure amorphous carbon can be cheaply obtained from anthracite culm. This carbon contains only about 1 to 2% of ash and a small amount of volatile matter. It resembles lamp black and can be used in place of it. Possibly it will form a substitute for charcoal in the manufacture of blister and crucible steel. Works are now being erected in Pennsylvania for the preparation of carbon by this method, but further details of the process are not at present available.

Discussion.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of THE ENGINEERING AND MINING JOURNAL.

THE ELECTRO-DEPOSITION OF COPPER.

The Editor:

Sir—This JOURNAL (Aug. 12, 1905, p. 247) contained an abstract of a paper by Sherard Cowper-Coles, read before the Faraday Society (London, July 3, 1905), on "The rapid electro-deposition of copper." As the official abstract of the Faraday Society seems hardly to do me justice, I venture to publish this comment.

I regret that there is not much that I can congratulate the author upon in his paper; it not only lacks those details which would have made it a useful resumé of what has been accomplished, but it also omits mention of important steps which others have taken. Notably is this the case in omission of all mention of heating the electrolyte, of the purification of the same, and of the maintenance of proper ratio of free acid, copper salt and water. The paper as a whole fails to differentiate between what has been accomplished and what has been merely proposed.

Class 1—The description of the Wilde process is all too brief, and does not, in my opinion, give the credit to Wilde that is justly his, for Wilde's patent marked an epoch almost as important as did the Elkington patent. I take exception to the statements that "the cathode is revolved slowly," and that "the current density employed is comparatively low; the operation requiring many days."

Class 2—The Elmore process is dismissed by the author in six lines of his paper; yet, so far as copper is concerned, it is at the present time, industrially, the most important electro-metallurgical process next to the electrolytic refining of copper, judged either by the money value of its output, by the tonnage produced, or by reason of the high-current density employed. Further, in the same connection, it is the only process which has so far found commercial application on a large scale for the direct production of a finished article. The illustration given was entirely erroneous as representing the internal arrangement of a typical tank under the Elmore system. A tank so arranged would take several times the 0.5 to 1 volt (stated by the author) to obtain a current density of 20 amp. per sq. ft. of the cathode.

The current density in the Elmore process, without circulation, can be, and occasionally is, pushed up to 30 amp. per sq. ft. quite safely; and in the more recent form of special plant which has been devised for use with circulation, the current density has been carried up to over 200 amp. per sq. ft. of cathode. The burnished material produced gave 25.5

tons tensile strength per sq. in. with an elongation of over 30% measured on 10 in., and with a ratio of elastic limit to break of over 90%. By suitable adjustment of conditions, a tensile strength of as high as 42 tons has been attained (as certified by Professor Unwin).

Anyone who has the requisite knowledge of the action of burnishers (applied to the surface of the cathode during deposition) readily recognizes that the remarkable strength, for which the Elmore material is noted, results from the use of the burnisher; absolute perfection of the surface produced enables the current-density to be raised to a high figure. Where violent agitation of the electrolyte is resorted to in conjunction with burnishing there are no interstices for the mud to lodge in; this smoothing by the burnisher enables the same high current density to be used with a much less expenditure of power for a given weight of product than in any similar processes.

Class 3.—The people who were responsible in England for the Dumoulin fiasco, vehemently repudiated any connection of their process with burnishing. The so-called "impregnators," it was urged, need not actually touch the whole surface of the cathode; on the contrary we were asked to believe that any projection from the general level of the surface of the cathode would conveniently insulate itself by removing just sufficient grease from the "impregnator" and would thus receive no more deposit till the whole surface of the cathode had been brought up to the level of the highest projection.

I wish to emphasize this point because of the difference between an impregnating device such as Dumoulin intended using, and a true burnishing device first proposed by Elmore. The word "burnisher" clearly indicates something hard, such as the agate tool of Elmore described in his earliest patent.

Class 4.—Frank Elmore was many years before anyone else in commercially employing jets of liquor impinging on the surface of the cathode to accelerate the rate of deposition of nickel and copper. (As the matter is stated by the author it may be read that J. W. Swan was the pioneer.) Frank Elmore's patent is dated 1886. Millions of square feet have been coated in this manner with his plant at high current density. Iron, lead, zinc, antimony and other metals have also been successfully deposited by Mr. Elmore with this type of apparatus. Others have appropriated (what I believe to be Mr. Elmore's original idea) without acknowledgment.

The aggregate output of the Elmore works in England, Germany, Russia and France is now nearly 7,000 tons per annum, representing an area of about 2,500,000 sq. ft. of deposited tube; the returns of goods from customers because of defects does not reach 0.2% on an average and of this quantity of returned material the great bulk is due to errors of size, damage in packing, transport, etc.; but no part of it is due to laminations arising from the burnisher.

In perfecting the Elmore process, I was associated with my brother. A careful study was made as to the relative effect on the quality of the deposit when being rubbed by liquor (as is done in the centrifugal process), and when polished by a comparatively soft material (such as wood), and so on through a variety of substances, ending in a burnishing or crushing of the minute crystals by an agate burnisher.

A tensile strength of 25 tons, and an elongation of 30%, could be definitely relied upon when using an agate burnisher. The expenditure of power necessary for the mechanical service of the tanks is only about 10% of that required in the case of the centrifugal or impingement processes.

It is true that under laboratory conditions, without a burnisher, a perfect looking product can be obtained at times, but appearances are deceptive; many defects (which were not observable by the naked eye) developed when the samples were submitted to bending, bursting, tensile, torsion and heating tests.

I note that the author suggests the making of tubes on a commercial scale by this centrifugal process. How does he propose to make tubes of less than 2½ in. diameter (of which the bulk of the trade consists)? Is it proposed to mount each of these 2½ in. mandrels 12 to 18 ft. long vertically in tanks, and to endeavor to line them up with the anodes and rotate them at something over 1,000 r. p. m.? If so, I think he will have some interesting experiences in the way unstayed shafts can whip, and wreck the surrounding plant, when running at these speeds. To summarize the matter I say that the rotation of a cylindrical cathode at a high speed is at least as old as Wilde's patent. In Wilde's apparatus, a half-twist belt is usually employed for obtaining this motion, an arrangement preferable to that employed by the author (pumping the corrosive copper-sulphate liquor up to such a pressure as to enable it effectively to operate the Pelton wheel).

I hope that the remarks I have made may not be in any way taken as attempting to deprecate what has been actually accomplished by the author. I would ask him to accept my assurance that (while my remarks may not appear complimentary) there is a duty we all owe to the pioneers in every industry; and it is mainly to secure a recognition and a due appreciation of those who have "blazed the trail" that I have made what may seem at first sight a rather ungenerous criticism of the author's work.

A. Stanley Elmore.

London, England.

SLAG CALCULATION.

The Editor:

Sir—In this Journal (July 22, 1905, p. 117), under this heading, W. R. writes with regard to Mr. Palmer's computation of a copper slag: "It is to be remarked, moreover, that the method outlined only shows what the composition of a slag resulting from a certain charge will be; and it does not indicate how the components of a charge are to be put together to make a slag of desired composition." He then mentions H. Van F. Furman's method of doing this, using *x*, *y* and various other signs. Here is a method based on chemical principles, which should fill the want.

The kind of slag made will depend on the nature of the charge, and on the way in which the furnace is run. While a wide range of composition is permissible in copper work, still the slags nearly always approximate to definite chemical formulæ; that is, the relation between silica, iron and lime (corrections being made for alumina, magnesia and zinc) will be found to correspond approxmately to those of definite silicates. The silicates mostly used are the mono-, sesqui- and bi-silicate. Tables of the ratios between silica and base in these silicates have been compiled by Professor Balling, and are found in most text-books on metallurgy. It is easy enough to calculate them. Take for instance the sesqui-silicate of iron $(FeO)_4 (SiO_2)_3$. The formula-weight of 4 FeO is 288; that of 3 SiO_2 is 180; hence: Base : Silica :: 288 : 180; or as 1 : 0.625.

Referring now to Mr. Palmer's example (this Journal, June 29, 1905, p. 1223), the slag aimed at is evidently a bi-silicate of both lime and iron. The smelting proposition is clearly a silicious one. The principle is to flux the available iron with silica; the silica remaining, over and above this, is then fluxed with lime. In order to simplify, the action of alumina, magnesia and zinc will not be considered here.

Proceed exactly as Mr. Palmer has it, with the exception that, the weight of limerock required on the charge not being known, its place is left blank. So far, then, we have 1,295 lb. of FeO available for slag; and 2,364 lb. of SiO_2 (the 115 lb. with the lime being, of course, left out). To flux the iron as a bi-silicate, multiply it by 0.833, thus:

$$1{,}295 \times 0.833 = 1{,}079 \text{ lb. } SiO_2;$$
$$2{,}364 - 1{,}079 = 1{,}285 \text{ lb. } SiO_2,$$

to flux with lime.

Now, most limerock contains some SiO_2 and FeO, which must be fluxed in exactly the same way as above. In this case there is no FeO present, so it will be necessary to flux the 5% silica with lime. To find lime required for a bi-silicate, divide by 1.07; $5 \div 1.07 = 4.67$. Subtract this from the 50% CaO, and we get 45.3% CaO available for fluxing purposes.

Going back to the original calculation, we have 1,285 lb. of SiO_2 to flux with lime as a bi-silicate. 1,285 ÷ 1.07 = 1,200 lb. CaO. As the available CaO in the limerock is 45.3%, it will require

$$\frac{1200}{45.3} \times 100 = 2650$$

lb. of limerock on the charge. Put this 2,650 in the weight column, and figure SiO_2 and CaO accordingly. The former is 132 lb., and the latter 1,325 lb. The total silica now adds up to 2,496; and the lime, 1,325. The FeO being 1,295, the sum is 5,116. Divide by 0.87 and we get 5,880. The slag then figures out: 42.4% SiO_2; 22.5% FeO and 22% CaO. Total, 86.9%. To show that this checks, apply the same factors to the FeO and CaO, thus: 22.5 × 0.833 = 18.75; and 22 × 1.07 = 23.55. 18.75 + 23.55 = 42.3 silica.

A bi-silicate slag has thus been obtained. Sometimes a sesqui-silicate of iron goes with a bi-silicate of lime; in which case the factor 0.625 would be used on the FeO, instead of 0.833.

On the face of it, Mr. Palmer's slag appears too silicious, and on applying the above factors to the FeO and CaO, the required SiO_2 is but 40%. In actual practice he would, of course, have recalculated the charge with more limerock, so as to bring the silica down to the amount required for bi-silicate slag.

More than one successful metallurgist has assured me of the infallibility of the following "formula": "If your boss is an 'anti-formula crank,' keep your furnaces running fast, but don't talk 'silicates'; if he is a 'formula crank,' then, by all means, find him a formula for your slag; you will need it in your business; but—keep an eye on the tap-hole."

O. E. JÄGER.

Anaconda, Mont., Aug. 8, 1905.

Correspondence.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Electrostatic Concentration.

Sir—Several years ago, when the Blake-Morscher process was in the experimental stage, I had an opportunity to examine that electrostatic marvel. The problem of treating each grain of ore as though it were more or less of a pithball on the old frictional (or better, the old Holtz machine), was itself a novel thing. But the most marvelous wonder shown me was the new machine for developing electrostatic charges. It was a common, unassuming, plebean sort of a thing; a few rotating sheets (of mica, they tell us now), a few wires in an old box; but it gave out the best supply of electrostatic charges of any machine of that class that I have ever seen. Moréover, it did this under conditions that, to say the least, would be discouraging to the ordinary electricity-maker. Again and again did Mr. Swart or Professor Blake throw handfuls of dust, dirt or concentrate into the revolving plates. There would be a momentary cessation of sparks, a husky, buzzing noise and the machine, after clearing its throat, would sing out its usual supply of electrostatic charge. This teasing was only to show what the machine could do.

I remember that at that time I asked Professor Blake as to the unit of static electricity; its name and value in terms of the absolute *c. g. s.* system. I knew of the coulomb, the volt, the ohm, the ampere, the watt, the farad, the henry, etc., but what should we call this new unit of electrostatic charge, which is of commercial value and which must have a name, a measure and a price? He told me that there was none yet recognized or adopted. In his recent paper (this JOURNAL, June 1, 1905, p. 1036) he discusses the energy relations, but he gives no new name (unless it be the "electrical capacity, C"). Perhaps we can get along with a skilful use of the old ones. If so, that will be equally acceptable.

PILGRIM.

Philadelphia, Aug. 21, 1905.

New Books.

Les Aciers Spéciaux, second volume. By M. Leon Guillet. Preface by Henry Le Chatelier. (9 in. by 11 in.) Pages, 132. Vve. Dunod, Paris, 1905. $1.75.

Thirty-fifth Annual Report of the Deputy Master and Comptroller of the [English] *Mint,* 1904. (6 in. by 9 in.) Pages, 209. Wyman & Sons, Ltd., London. $0.50, paper.

The Geology of the Kiama-Jamberoo District. New South Wales Geological Survey. Vol. VIII, Part I. Pages 66; with plates. William Applegate Gullick, Sydney, N. S. W., 1905. Price, $2.

The Gold Placers of the Fortymile, Birch Creek and Fairbanks Regions, Alaska. By Louis M. Prindle. Bulletin No. 51, United States Geological Survey. (6 in. by 9 in.) Pages, 87. Government Printing Office, Washington, D. C., 1905.

The Fairhaven Gold Placers, Seward Peninsula, Alaska. By Fred H. Moffitt, United States Geological Survey. (6 in. by 9 in.) Pages, 85. Government Printing Office, Washington, D. C., 1905.

Contents—Geography; general geology; economic geology; general conditions.

Machine-Shop Tools and Methods. By W. S. Leonard. 8vo, vii + 554 pages, 689 figures. John Wiley & Sons, New York; Chapman & Hall, Ltd., London, 1905. Price, $4, cloth.

Contents—The measuring system of the machine shop. Standards of length. The hammer and its use. Chisels: their forms and uses. Files and filing. The surface plate and scraper. The vise and some vise accessories. Drilling machines. Drills and drilling. Drill sockets, drill chucks and accessories. Construction and use of reamers and bits. Lathes. Turret machines and turret-machine work. Lathe and planer tools. Lathe centers, work centers, etc. Methods of driving work in the lathe. Dogs and chucks. Lathe arbors, or mandrels and arbor presses. Some examples of engine lathe work. Thread cutting in the engine lathe. Screw threads, taps and dies. Bolt and nut threading machines. The boring bar and its use. Horizontal-boring and drilling machines and work. Crank-boring machines. Vertical-boring and turning mills, tools and work. Planers and shapers, and planer and shaper work. Slotting machines and the work to which they are adapted. Key-seating machines and keys. Milling machines and milling machine work. Special gear machines. Grinding machines and methods. Polishing and buffing wheels. The interchangeable system of manufacturing. Miscellaneous machine shop methods. Tables, recipes, etc.

This book is designed to serve as an aid in connection with the author's lectures given in the mechanical department at the Michigan Agricultural College.

There are a great number of excellent illustrations, many of which show mechanism of the most modern type. The tables given are few in number, but complete, and the typography is an indication of the care with which the book has been prepared.

Metallurgie du Zinc. By A. Lodin. Pages, 810. Illustrated. Size, 6 by 9½ inch. Vve. Ch. Dunod. Paris. 1905. Price, $12, New York, paper.

Contents—Historical. Fundamental reactions. Deposits of zinc ore. General principles of the metallurgy of zinc. Calcination of calamine. Blende roasting. Utilization of the sulphurous gas. Distillation; Corinthian, English, Silesian and Belgian methods. Silesian furnaces. Modern Belgian furnaces. Rhenish furnaces. Accessory operations. Variations in the practice of distillation in retorts. Smelting in shaft (blast) and reverberatory furnaces. Manufacture of zinc oxide. Statistics of production.

The metallurgy of zinc, which for a century was deficient in its technical literature, has suddenly become rich, the treatise of Ingalls having now been followed by this one by Prof. Lodin. The industry is fortunate in having comprehensive works, both in the English and in the French languages. Comparison between the two will naturally be made.

As would be expected, Ingalls is the stronger in the treatment of American practice; Lodin in that of European. In other respects, Ingalls leans rather to the engineering aspect of the subject; Lodin to the purely metallurgical.

Prof. Lodin gives a very comprehensive account of the zinc resources of the world, especially the European. He goes exhaustively into the metallurgical history of zinc and traces minutely the development of the art of smelting and particularly the types of furnaces which have been evolved. A rather excessive proportion of the work appears to be devoted to that subject, the treatment of which discloses exhaustive study and painstaking labor. Its usefulness will be, however, readily admitted, inasmuch as the experience of the past is the best guide to right progress in the future.

The scant and slighting discussion of mechanical roasting furnaces would be a great disappointment had they not been treated so fully by Ingalls, and this is a defect in Prof. Lodin's work. The explanation of this is of course that mechanical roasting is not much employed in Europe. On the other hand, Prof. Lodin's descriptions of the distillation furnaces used in Europe are superb.

Prof. Lodin's treatise will become one of the classics of metallurgical literature, and the zinc industry is to be congratulated upon this further enrichment.

Transactions of the Australasian Institute of Mining Engineers. Vol. X. Edited by A. S. Kenyon, Secretary. The Institute, Melbourne, N. S. W. 1905.

Contents—Presidential address, by F. Danvers Power. The Mount Lyell mining field, Tasmania, with some account of the geology of other pyritic orebodies (with 18 plates and 29 figures), by Prof. J. W. Gregory. Concentration of silver-lead ores (with 6 plates), by V. F. Stanley Low. Phosphate deposits of Ocean and Pleasant islands (with 15 plates), by F. Danvers Low. Coal and coal mining in New South Wales, by Thomas Parton. A method of timbering at the Mount Rex tin mine, Ben Lomond, Tasmania, by Mark Ireland. Peck's centrifugal elevator (with 1 plate and 1 figure), by W. Peck. A portable assay-furnace (with 1 figure), by J. J. Gillio. Notes on sampling, by A. C. Thomas. The career of the gold dredge in New South Wales, by David K. Blair. The transmission of power by compressed air in mines (with 3 figures), by R. W. Chapman. The misplacement of mining shafts and adits in Victoria (with 7 figures). The indicators of the Daylesford gold mines, Victoria (with 4 figures). Mining accounts, by R. N. Kirk.

Evidence Given Before the Royal Commission on Coal Supplies (1901-1905). (Reprinted from the *Colliery Guardian*, after revision by the witnesses.) Volume I. (7¼ by 9½ in.) Pages, 474. The Chichester Press (Proprietors, The Colliery Guardian Co., Ltd.), London. 1905.

Contents—I. The working of thin seams. II. Limit of depth in mining. III. Waste in working. IV. Coal cutting by machinery. Appendix: I. Deep mining. II. Colliery leases and the drainage of areas. III. Forrest of Dean coalfield. IV. French collieries. V. Stowage of the goaf in German mines. VI. Coal cutting by machinery. VII. Bibliography.

In this volume the large amount of evidence given before the British commission has been arranged in groups, according to subject. This compilation of evidence, of the experience of more than 30 years of coal mining in Great Britain is a work of permanent value for reference.

Geology of Western Ore Deposits. By Arthur Lakes. 5½ in by 7 in. Pages, 415; with 300 illustrations. The Kendrick Book & Stationary Company, Denver, Colo., 1905. Price, $2.50, cloth.

Contents—Chapter (1) General geology. (2) Lithology. (3) Cavities. (4) Faults. (5) Influence of country rocks on veins. (6) Mountain uplifts and mineral belts. (7) Mode of occurrence of mineral deposits. (8) Ores of useful metals. (9) Theory of ore deposits. (10) Placers. (11) Examples of placers. (12) Boulder county, Colo. (13) Gilpin county. (14) Summit county. (15) Park and Lake counties. (16) Eagle county. (17) The Parks, Colo. (18) Pitkin county. (19) The Gunnison region. (20) Telluride, and the Smuggler Union. (21) Custer county. (22) Teller county. (23) Other Western states. (24) Tin in Alaska. (25) Concluding remarks. Glossary and plates. This readable little book is fresh, reliable, and uncommonly well illustrated, through mostly by line-cuts of free-hand sketches. The treatment is too casual to serve as a detailed geological guide; but the volume is well fitted for that large region which is between the technical and the popular. Indeed the variety and appropriateness of the illustrations will place the book on the shelves of many students of mining geology. As shown in the contents, the material considers ore deposits in general; those of Colorado at some length, and of the other Western states more briefly.

Modern Refrigerating Machinery. By Hans Lorenz. Translation of the third German edition by Thos. H. Pope; with chapters on American practice by H. M. Haven and F. W. Dean. First edition. 6 in. by 9 in. 8vo. Pages, 396 + 16; cloth. John Wiley & Sons, New York; Chapman & Hall, Ltd., London. 1905. $4.

Contents—Principles of the theory of heat. Methods of cold production and energy required. The construction of compressors. Apparatus for giving out and taking up heat. The erection of absorption machines. On the cooling of liquids and keeping them cold. Cooling of air. Manufacture of ice. Production and application of cold at very low temperatures. Determination of the yield of cooling-machines. American Practice: General methods of refrigeration. Refrigerated compartments. Insulation. Can ice-making. Plate ice-making. Refrigerating machinery. Air-cooling. Special application of refrigeration.

One of the most important works upon the subject covered by this book is made available in the Anglicized edition just issued. The value of the publication is greatly enhanced by the chapters descriptive of American practice. One of the most striking features is the great number of excellent illustrations, most of which show considerable attention to detail. The half-tones, however, are few in number, and the illustrations showing complete machines are confined almost entirely to the section describing American practice. The letter-press is good, and the tables are almost indispensable.

The book is technical, but not involved; the language is good; the definitions and descriptions are exceptionally clear and lucid. It is a distinct addition to engineering literature, and a book that may eventually rank as a classic. Both translator and author are to be congratulated upon the clear-cut, effective work that they have jointly produced.

Questions and Answers.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc. Preference will be given to topics which seem to be of interest to others beside the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

American versus British Coals.

Will you inform me whether British or American coals are higher in calorific value. Also, which country has coals exhibiting the best coking qualities?

A. R.

Answer.—There is a great variety in the coals produced both in Great Britain and America, especially in the latter, but we assume you refer to the best grades in each case.

Pennsylvania anthracite has a heating value of about 13,000 B. t. u. per lb. of coal (not of combustible); semi-anthracite about 14,000; semi-bituminous (Broad Top and Somerset, Pa., Pocahontas, Va., and New River, W. Va.), 14,200 to 15,200, the Pocahontas and New River being the best. The bituminous coal of the Pittsburg district, Pa., including Connellsville, is about 14,000. The best grades of Welsh, English and Scotch coals range from 14,600 to 15,200. As will appear from these figures, there is little to choose between the best American and British coals.

With respect to coke, substantially the same may be said. The Connellsville, New River and Pocahontas cokes are of very high grade, while the Durham and other cokes of Great Britain are excellent in quantity.

The Bartlett Zinc-Lead Process.

Will you outline to me the essential features of the Bartlett process and inform me where I can obtain full particulars concerning it?—B. E. S.

Answer—In the Bartlett process, the ore is first burned on a grate, similar to the Wetherill hearth used for the manufacture of zinc oxide in New Jersey and Pennsylvania. The ore is in effect roasted rapidly and at a very high temperature, the latter being required both for sake of the volatilization of the zinc and also to maintain a temperature about the dissociation point of sulphur trioxide. The products of combustion, including the sulphur dioxide gas, are conveyed through iron cooling tubes and finally are filtered through woolen bags.

The cinder from these furnaces is subsequently smelted in the peculiar shaft (blast) furnaces of Bartlett's special design. In those furnaces, the height of the charge column is only about 18 in. There is a good deal of zinc remaining in the cinder from the hearths, and the products of combustion from the blast furnaces are also conveyed through sheet-iron cooling tubes, are united with the fume from the hearths, and are filtered along with the latter through the woolen bags. The use of the very low blast furnaces obviates the difficulty of scaffolding that would be experienced in an ordinary form of shaft furnace. The best account of the Bartlett process is to be found in a paper by F. L. Bartlett, published in *The Mineral Industry*, Vol. V.

Petroleum in Rumania.

Official statistics (reported in *Brit. For. Off. Ann. Series, No.* 3432) show an output of 497,000 tons of petroleum during 1904. The monthly average of 1904 was 37,176 tons during the first half-year, and 45,635 tons during the second half. Of the four oil-bearing districts of Rumania, the district of Prahova is the richest, the total output of that district showing 455,354 tons, against 26,234 tons in Dambovitza, 8,236 tons in Buzen, and 7,064 tons in Bacan. The number of hand-wells has increased owing to their small cost. Official figures show 744 wells in 1904, against 675 in 1903, and those in process of sinking 195, against 163. On the other hand the number of productive borings has decreased, the figures being 290 for 1903, against 224 in 1904. The borings under drill have, however, increased from 114 to 192.

The year under review records the most noteworthy events in the history of the petroleum industry of Rumania. German capital played a large part—the three German banks, Deutsche Bank, Disconto Gesellschaft and the Schaffhausen Bankverein, being the medium through which fresh companies were formed and old ones supported.

The exports of petroleum from Rumania during the years 1899-1903 were as follows:

Year.	Total.	
	Quantity. Tons.	Value. £
1899	62,109	305,558
1900	72,700	386,519
1901	42,600	237,694
1902	68 772	129,739
1903	103,962	171,092

Platinum Production in Russia.

According to W. A. Dyes (*Chem. Ind.*, 1905, XXVIII, 378—381), notwithstanding an increased supply in recent years, platinum has become considerably dearer, the price during 1904 ranging from 16,000 to 19,000 rubles per poud (1 ruble = $0.77; 1 poud = 36 lb.). Both the price and production of Russian platinum have fluctuated considerably, as is shown in the following table

Year.	Price.	Production.	Year.	Price.	Production.
	Rubles.	Pouds.		Rubles.	Pouds.
1869	1,600	140-0	1893	.....	311-3
1874	.....	120-0	1894	.....	318-0
1882	.....	250-0	1895	.....	269-5
1890	12,000	270-0	1896	.....	301-0
1891	5,000	258-6	1897	.....	342-0
1892	7,000	279-2	1898	13 000	367-0

In 1900 the production was 310.7, and in 1901, 389 pouds, while during the period of 1899-1904 it averaged 350 pouds. The increased production of 1901 has not been maintained, owing chiefly to two reasons.

In the first place the greater number of the more important mine-owners are bound by contracts covering a period of 10 years, whereby, whatever be the price of platinum in the markets of the world, they have to deliver their product to the large refining firms at a fixed price of 10,000 or 11,500 roubles per poud. These mine owners, not being in a position to receive any advantage from the rise in price of the metal, have, therefore no inducement to increase the supply.

The second cause of the gradual decrease in the production of platinum lies in a diminution of the yield of the richer mines. In 1900 the maximum platinum content of the ore was 15.68 grams per 1,000 kg., but in 1901 the corresponding figures were only 5.89 grams. per 1,000 kg. In 1900, 100 firms, and in 1901, 120 were engaged in plainum mining in Russia. The mines are all situated in the Government of Perm, in three districts, of which Gorablagodatj produced 193.4 pouds in 1901 (118 in 1900), Krestowosdwischensk 99.8 pouds (99 in 1900) and Mischnetagilsk 71.8 pouds (76 in 1900).

Argentina's Laws for Professional Men.

Minister Beaupré writes from Buenos Ayres to the Department of State, at Washington, D. C., that an act, passed by the Congress of Argentina June 26, regulates the professions of engineers, architects and agriculturists. By the terms of the law it is required that all civil and mechanical engineers, architects, chemists, agronomists and surveyors, with the exception of those already established and special foreign experts (to whom, for lack of corresponding native talent, the executive may be compelled to intrust special tasks) must, in order to practice their professions in Argentina, have received diplomas from the universities and special schools of the nation; or if holding titles from foreign institutions, they must "re-validate" their titles in accordance with the regulations here in force.

The general intention of this law is to provide for the uniform qualification of those who practice the professions in question, as has long since been done in the case of physicians, dentists, etc. As in these last-named cases, for the purpose of "re-validation," the applicant will be required to pass examinations in the whole matter of his profession. That will necessitate the reviewing, if not the repetition, of his studies.

[The intent of this new law may be, in part, benevolent; but it certainly has a doubtful appearance. Minister Beaupré neglects to state the essential part of this new system, namely, the *fee* for this "revalidation." The new law may be a blessing; it is liable to prove an imposition.]

Alloys of Copper and Zinc.

O. Sackur has investigated (*Berichte der deutsch. chem. Gesell.*, 1905, XXXVIII, 2186—2196) the behavior of alloys, containing different proportions of copper and zinc. The results agree in indicating changes in the constitution of the alloys with about 41 to 45% and 60 to 62% of copper. Sackur considers that the main constituents other than the metals themselves are the compounds $CuZn_2$ (32.7% of copper) and CuZn (49.3% of copper); that the alloys of lower copper content are mixtures of the first compound with zinc, but that, owing to dissociation of $CuZn_2$, there is still free zinc present when the composition of the alloy reaches that of the compound, and that the change in character at 41 to 45% of copper is due to the disappearance of free zinc through the influence of the excess of copper on the dissociation of the compound; and that alloys richer in copper are mixtures of the two compounds with metallic copper, the compound $CuZn_2$ only ceasing to be present when the excess of copper has neutralized the tendency of CuZn to dissociate, *i.e.*, at 60 to 62% of copper. Changes in the color of the alloys, at 40%

of copper, from gray to reddish-yellow, and at 60 % from the latter color to golden-yellow, also indicate discontinuity at these two points.

[According to this, the gray color of brass with low copper is due either to free zinc, or to the $CuZn_2$ compound, or to both.]

The Faroe Coalfields.*

The coalfields of the Faröe islands appear to be unique in some features. These islands lie north of the British Isles, between Sweden and Iceland. In eight sections of strata, consisting chiefly of alternating layers of clay and coal, there were two only of shale, measuring, respectively, 1 in. and 2 in. in thickness, and none of sandstone, grit or limestone (which form the principal part of the coal measures in other localities). The clays are, in all probability, disintegrated volcanic ash and dust, similar to that which fell on St. Vincent and adjoining islands during the eruptions which occured at La Soufrière and Mont Pelé in the West Indies in September, 1902. It might be supposed that after the great outflow of lava (which everywhere formed the base of the coal-formation in the Faröe islands) periods of activity occurred at long intervals, when vast showers of dust and ashes fell, which (under the climatic conditions then prevailing) rapidly became fruitful soil and produced a luxuriant vegetation; this course of events was repeated until a succession of beds of clay and coal were piled up to the depth of about 180 ft., after which the whole was again buried beneath immense sheets of lava. This again may have been succeeded by other beds of clay and coal. The anthracitic quality of a considerable portion of the coal in the Faröe coalfields indicates that it was formed at an early period in the world's history. The Faröe islands had no doubt, suffered extensive denudation; it is probable that a considerable portion of the coal-formation (as it once existed) has been eroded and swept away.

If, instead of bauxite, chromite with only a little silicon and iron is used, as in the aluminum reaction, highly interesting results are obtained (according to *Rev. de Chim. Ind.*, 1905, p. 67). With a direct current of 60 to 70 volts, the aluminum, in the ferrochrome obtained, does not reach over 2%. By using two parts bauxite and three parts chromite, a 50% ferrochrome is obtained, which incidentally takes up the silicon from the bauxite. The aluminum produced at the same time is 98 to 90% pure, and is colored rose red by a trace (not over 0.1%) of chromium sesqui-oxide. It can be purified by remelting and keeping it covered with aluminic material.

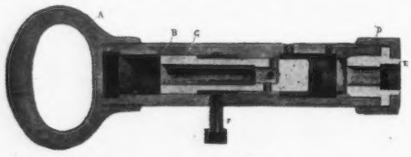
*Abstract of discussion in *Trans.* of Instn. of Min. Engr's., Vol. XXXIII., Pt. 4. pp.600-1.

The Murphy Air-Hammer Rock-Drill.

This drill, a section through the working parts of which is shown below, has been the object of considerable interest since being placed on the market about two months ago. This period is too short to admit of more positive information than is given in this article.

Most of the mines where the drill is in use have not yet had opportunity for an extended test. Reports, however, tend to show that the machine is giving a good account of itself. The Resurrection mine, of Leadville, Colo., is using the drill entirely; every miner takes one down with him. The Yak Mining & Milling Co., of the same place, reports satisfactory results. The Portland mine, at Cripple Creek, has recently made a test, the results of which are given in the table herewith; they are practically a corroboration of the first tests, made at the Resurrection mine.

The drill is a one-man machine, in appearance much like the familiar pneumatic hand-riveter. It is used with a solid piece of drill steel, cored for the passage of the exhaust. A dust-catcher



SECTION OF DRILL.

is also provided to keep down the flying particles, which at first were almost intolerable.

The machine strikes 2,000 blows per minute. The temperature of the bit is kept down by exhaust air (which also keeps the hole clean), thus rendering this high speed practicable. The makers claim that the use of this drill will effect a saving of approximately 50% in the cost of breaking rock underground, and this over either hand-drilling or mounted machines.

The holes are put in as though the ordinary "jack" or hammer drill were being used. When put down 2.5 ft., they will usually shoot to best advantage; it is easy to take out the machine, shoot what holes are desired, and then proceed again. The drill does not need to be set up or taken down. This is the great advantage of this type of machine. It can be handled with the same ease as the ordinary "jack," and does the work of a mounted machine. The holes drilled with it are loaded as if driven by hand, and economy in powder is a direct result. The drill man is not tempted to run holes too deep, nor to charge them too heavily in order to avoid "setting up" again.

The Murphy drill is made by the C. T. Carnahan Manufacturing Co., of Denver, Colo., from whose catalogue we take the illustration. Perhaps the most expressive statement as to the ease of operation is contained in the directions, which we quote as follows: "Slip the shank of the drill steel in the end of the drill; place the bit against the rock; hold firmly, turn on the valve and let her go."

The record of the Murphy drill for four shifts, driving a drift, in the Portland mine, Cripple Creek, Colo., was as follows:

Wages of machine men @ $4.00	$16.00
Pipe and track	1.50
Mucker	9.75
Explosives	9.15
Air and repairs for machine	3.20
Hoisting	7.06
	$46 66
Average per shift driven	3.50 ft.
Average cost per foot	$3.33

These figures were prepared by the management of the mine; they include the cost of pipe, track, mucking and hoisting. These items amount to $18.31 for four shifts and 14 ft. driven. This is a cost per foot of $1.31, leaving the actual cost of breaking ground $2.02 per foot.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week ended August 15, 1905.

797,003. ORE-ROASTING FURNACE.—Henry C. Holthoff, Milwaukee, Wis., assignor to Power & Mining Machinery Company, Cudahy, Wis., a corporation of New Jersey.

797,068. MINING APPARATUS.—Alexander McDougall, Duluth, Minn.

797,111. ROCK-DRILL OR ROCK-DRILLING MACHINE.—Henry Hellman and Lewis C. Bayles, Johannesburg, Transvaal.

797,116. ELEVATOR FOR LOADING AND UNLOADING COAL, ETC.—Gerald E. Holland and Henry Johnston, Rangoon, Burma, India, assignors to the Holland Johnston Patents, Ltd., London, England.

797,150. PROCESS OF AGGLOMERATING IRON-WASTE, ETC., FOR THE MANUFACTURE OF ORE BRIQUETS.—Thomas Rouse and Herrmann Cohn, London, England.

797,168. MINING-SLUICE.—Pierre Bouery, Weaverville, Cal.

797,202. STAMP-MILL.—Charles J. Hodge, Houghton, Mich.

797,222. METALLIZING PLANT.—Albert R. Pritchard, Rochester, N. Y.

797,239. DRY CONCENTRATING-TABLE.—Henry M. Sutton, Walter L. Steele and Edwin G. Steele, Dallas, Tex.

797,290. WATER-PURIFIER.—Cass L. Kennicott, Chicago, Ill., assignor to Kennicott Water Softener Company, a corporation of Illinois.

797,323. PROCESS OF MAKING CHROMATES.—Peter Roemer, Bernburg, Germany.

797,352. REVERBERATORY FURNACE.—Arthur M. Gaylord, Auburn, N. Y.

797,506. PROCESS OF BURNING CEMENT.—Byron E. Eldred, Bronxville, N. Y., assignor to Eldred Process Company, New York, N. Y., a corporation of New York.

797,511. PROCESS OF PREVENTING AND EXTINGUISHING FIRES IN PETROLEUM, ETC., SPRINGS.—Conrad Gautsch, Steglitz, near Berlin, Germany.

797,529. METHOD OF TREATING OIL-WELLS.—Fidelio H. Oliphant and Henry Lyddon, Oil City, Pa.; said Lyddon assignor of one-half of his right to said Oliphant.

797,537. LIMEKILN.—Saul W. Shoop, Front Royal, Va.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. Frederick S. Harris is in New York.

Mr. Ralston Bell, of Montana, was in Denver last week.

Mr. Forbes Rickard is in Lake City, Colo., on professional business.

Mr. Jas. D. Sword, formerly of Rossland, B. C., is now at Goldfield, Nevada.

Mr. Leo von Rosenberg is at present in the La Plata district of southern Colorado.

Mr. W. W. Wishon, of San Francisco, was in Salt Lake City last week, on his way home from the East.

Mr. R. R. Wade, of Kansas City, Mo., has gone to Jarilla, N. M., where he expects to remain some time.

Mr. A. H. Hale, formerly of Cripple Creek, has returned from British Guiana, where he has spent some time.

Mr. J. E. Beveredge, of Salt Lake City, has been making examinations in Bingham district for eastern parties.

Mr. G. H. Grant, of Victoria, B. C., has gone to Juneau, Alaska, to examine some mining properties in that locality for United States clients.

Mr. R. N. Dickman, of Chicago, has recently been in Madera county, Cal., inspecting iron ore properties there for the Southern Pacific road.

Mr. W. Gillette Scott, general manager and superintendent of mines for the Great Western Gold Co., at Ingot, Shasta county, Cal., has resigned.

Mr. R. L. Wetmore, of Brooklyn, vice-president of the American Shipbuilding Co., is inspecting the company's large yards at the head of Lake Superior.

Col. R. A. Swain, Lake Superior representative of the General Electric Co., with headquarters at Duluth, has just returned from Columbus, O., where he was married.

Mr. Edward L. Dufourcq, of New York, is on his way to Colorado and Utah to examine mineral properties, expecting to be in New York again at the end of September.

Messrs. Louis Loranger and D. E. Woodbridge, of Duluth, Minn., have been making examination of mining properties in Algoma, Can., for the Dorion Zinc & Lead Mining Company.

Mr. J. C. Rodder informs us that a current statement connecting his name with the Wildman Mining Co., of Sutter Creek, Cal., is erroneous, and he wishes to correct any such statement.

Professor J. C. Gwillim, of the Kingston School of Mines, Ontario, has been visiting mining properties in the Boundary and Slocan districts of British Columbia, since his recent return from the Yukon.

Mr. L. E. Thomas, formerly with the United Engineering & Foundry Co., Pittsburg, has accepted the general management of the Birdsboro Steel Foundry & Machine Co., Birdsboro, Pa., and is now in charge.

Mr. Harry R. Hall has completed his contract with the Delaware & Hudson Co., and has been succeeded by Mr. James Duane as superintendent of Standish (N. Y.) furnace for the Northern Iron Co, which lately leased the plant.

Mr. W. J. Sutton, geologist for Messrs. Dunsmuir, of Vancouver Island, B. C., last month visited some mining properties at Quatsino sound, and early this month proceeded to the Nicola country to look over some of the coal showings in that neighborhood.

Mr. R. A. Bainbridge, for some time resident engineer in the Kootenay for the Canadian Pacific Railway Co., has been promoted to the position of assistant divisional engineer on the Pacific division, which embraces all lines from the Rocky mountains to the Pacific.

Mr. Geo. H. Robinson, president of the Britannia Copper Syndicate and of the Britannia Smelting Co., has returned to British Columbia after an absence in Utah. It is stated that he will shortly visit Prince of Wales Island, southeast Alaska, and there examine the Mount Andrew copper mine, on which he has secured an option.

Col. Geoffrey Porter, director of the India Mint, has visited the nickel deposits of Sudbury, Ont., and recently called at the Ontario Bureau of Mines to make inquiries in regard to procuring a supply of Canadian nickel for coinage purposes, the Indian Government having authorized a new pure-nickel coinage for the anna, a piece of money of the value of about three cents.

Mr. Walter E. Harrington has resigned his position as vice-president and general manager of the New York-Philadelphia Co., to become associated with J. G. White & Co., of New York, as operating manager. He will supervise all of the railway, electric lighting, gas and other properties operated by the company, and will make his headquarters at its New York office.

President T. F. Cole, of the Oliver Iron Mining Co., of Duluth, is at Watersmeet, Mich., at Sylvania Lodge, together with Mr. D. G. Kerr, of the Carnegie Steel Co. Messrs. W. E. Corey and Jas Gayley, of the United States Steel Corporation, are expected there in a few days. These gentlemen and a few others have several thousand acres of wilderness near Watersmeet, where they occasionally rest and enjoy the fishing.

Mr. M. M. Johnson, chief consulting engineer for the Dominion Copper Co., which recently acquired the mines and smelter of the Montreal & Boston Co., in the Boundary district, has returned to Salt Lake City, Utah, after having spent several weeks at Phoenix and Boundary Falls in connection with the resumption of work on the company's properties. Mr. Thomas R. Drummond is resident manager for the Dominion Copper Co., and Mr. W. C. Thomas, smelter superintendent.

Mr. W. J. West, formerly manager of the Sharon Steel Co.'s mines on the Mesabi range, has been made assistant manager of the Oliver Iron Mining Co.'s mines in the Hibbing district, the position being a new one. The superintendencies of the company in the Hibbing district have been changed as follows: For the Hull and Rust mines, Mr. M. H. Godfrey; for the Pillsbury, Glen and Clark, Mr. W. M. Tappan; for the Burt, Pool, Morris and Sellers, Mr. Chas. S. Simpson; for the Chisholm, Monroe and Tener, Mr. R. J. Mitchell; for the Myers and St. Clair, Mr. Willard Bayliss. Mr. Pentecost Mitchell remains general manager for the group, reporting directly to the office at Duluth.

Obituary.

Frederick Borchers, a young mining engineer, of Philadelphia, was shot and killed Aug. 15, in a quarrel at Cripple Creek, W. Va. He was 25 years old, and had recently completed a course of study in Germany.

Francis B. Laughlin, who nearly half a century ago established furnaces in Armstrong county, Pennsylvania, and later in Pittsburg, died in the latter city Aug. 9. He was born in 1835 and died at the age of 70. For the past six years he had been retired on account of ill health.

William R. Storrs, formerly general coal agent for the Delaware, Lackawanna & Western Co., died at Scranton, Pa., Aug. 9, aged 81 years. He had been with the Lackawanna for 33 years and was connected with the old New London, Willimantic & Palmer road in the early forties.

Joseph M. Freck, who died in Pottsville, Pa., Aug. 10, aged 79, was for many years a coal operator in the Schuylkill division of the anthracite region. For a long time he worked the Freck colliery at Centralia, Columbia county. During the reign of the Molly Maquires, he was attacked upon several occasions by members of that organization, but escaped. He was a partner of the late Franklin B. Gowen in mining property in Arizona.

James J. Cone, one of the pioneer mining men of the Cripple Creek district and since many years a resident of Cañon City, Colo., died at Stevens Point, Wis., on Aug. 13, the result of a stroke of apoplexy. He had an attack of that

disease a few months ago, just after a fall of 20 ft. in the Ophir mine at Cripple Creek, in which he was interested. He was 70 years old, and was one of the trustees of the State School of Mines.

J. Herbert Bagg died at his residence in the Bay Ridge section of Brooklyn, N. Y., Aug. 16, aged 37 years. He was the secretary and a member of the executive committee of the General Chemical Co. Born and educated near Brockville, Ontario, he became connected with the Brockville Chemical Works nearly 20 years ago. After moving to New York, he was first with the Nichols Chemical Co. and later, when the consolidation of interests was made, of the General Chemical Company.

Societies and Technical Schools.

Thomas S. Clarkson Memorial School of Technology.—The latest *Bulletin* of this institution, at Potsdam, N. Y., contains the proceedings of the annual commencement, with the addresses delivered on that occasion. Prominent among these is one on "The Engineer as an Economist," by Mr. C. J. H. Woodbury, of Boston.

Worcester Polytechnic Institute.—A chair in electric railway engineering has been established at the Worcester Polytechnic Institute, Worcester, Mass., and definite instruction in that branch of engineering is to be given during the coming year. Mr. Albert Sutton Richey, chief engineer of the Indiana Union Traction Co., has been appointed assistant professor of electrical railway engineering. Mr. Richey is a graduate from the course in electrical engineering of Purdue University of the class if 1894, and since the time of his grauation he has been constantly engaged in practical electrical work.

Trade Catalogues.

We note the receipt of the "Bulletin of Prices Current of Chemicals and Minerals," issued by the old and reliable house of Eimer & Amend, of New York. This bulletin not only meets the requirements of chemists fully; it contains many quotations of articles not to be had elsewhere.

The Delaware & Hudson Co. issues very attractive pamphlets and folders describing the country along its northern lines, and especially the steamboat lines through Lake George and Lake Champlain. It is hardly necessary to refer to this region, which is one of the most beautiful in America. Mining interest attaches to this region also. Besides the graphite mines at Ticonderoga, there are the iron mines at Port Henry and Crown Point, on Lake Champlain; and the company is now actively working the large deposit of magnetic iron ore at Chateaugay, in the northern Adirondack region.

Industrial.

The German-American Portland Cement Co., La Salle, Ill., has increased its capital stock from $450,000 to $600,000, the added capital, together with $150,000 mortgage bonds, to be devoted to enlarging the works. All machinery has been provided for.

Mr. R. W. Christian, who has been recently in the East, says that he has nearly completed changing his dredge at Gold Creek, Ore., from steam to electrical operating. Mr. Christian's visit was for the purpose of renewing his connection with the Allis-Chalmers Co. The contract between these parties extends over a number of years, and Mr. Christian can be consulted on all dredge questions directly, or through the Allis-Chalmers Co., at Milwaukee.

The Colorado Iron Works Co., manufacturer of ore-milling and smelting equipment, announces that the New York sales agency, formerly in charge of the Traylor Engineering Co., Mr. S. W. Traylor president, at 114 Liberty street, has been discontinued, and for the present the company is not represented in the city. All inquiries, requests for specifications, estimates, etc., will therefore be handled direct from the main office at Denver, Colo., until further notice.

The Iroquois Iron Co., of Chicago, will build another blast furnace. The location of the stack has not been made public, except that it will be built in South Chicago. The furnace will be of modern dimensions, with a capacity of not less than 300 tons a day. Construction work will be commenced early in the fall. The two other furnaces of this company at South Chicago have an advantageous location on the Calumet river, but it is doubtful if there is room on this site for a third stack without considerable re-modeling of the entire plant.

The Pelton Water Wheel Co. reports new orders as follows: Homestake Mining Co, Lead, S. D., 800-h.p. Pelton wheel unit direct-connected to an electric generator. The Nevada Power, Mining & Milling Co. has closed for an additional Pelton wheel of 3,000-h.p. maximum capacity, the wheel being direct-connected to an electric generator and operating under a head of 990 ft. This company is now installing two Pelton wheels for direct connection to 750 kw. generators and proposes to transmit power to Tonopah and Goldfield, Nev. Through Mitsui & Co., San Francisco, there was placed an order for a 500-h.p. wheel for use in an electric-light station in Japan.

The George H. Gibson Co. is a partnership formed by Halbert P. Gillette and Geo. H. Gibson. They will be known as advertising engineers, with offices in the Park Row Building, New York city. Mr. Gillette was formerly associate editor of the *Engineering News,* and Mr. Gibson, manager of publicity for the International Steam Pump Co., manager of the advertising department of the B. F. Sturtevant Co., and editor of the Westinghouse Co.'s publishing department. The object of the company is the presentation, for promoters of new things of value in the engineering trades, of those devices and improvements which experience has shown need advertising to bring them into commercial success within a time compatible with their engineering value.

There is a large field of application in modern industrial plant work for the vertical motor. Its use enables the machine designer to do away with the necessity of turned belt, beveled gears, etc. The equipment makes the driven machine compact in arrangement and secures greater economy of operation than is possible by ordinary means of power transmission. The Northern Electrical Manufacturing Co., of Madison, Wis., has paid special attention to the development of vertical motors, and in its design eliminates the trouble due to lubrication of a vertical armature shaft. The Northern vertical motor is extensively employed in all fields of work. Where required the Northern single-voltage system is applied to the vertical motors, thus making it possible to operate the driven machine at the speed best suited to the requirements of the work. Simple controlling devices are used and the motors operate from any ordinary two-wire single-voltage direct-current circuit.

INFORMATION FOR EXPORT TRADE.

The Department of Commerce and Labor is desirous of securing the co-operation of manufacturers and other persons interested in the efforts being made by the Department, through the Bureau of Manufactures, to extend the foreign trade of the United States. In furtherance of this work, it is proposed to establish a comprehensive card index which will enable the Department, upon application, to furnish information desired by manufacturers, or by intending purchasers, and it is proposed to extend the system, if the necessary authority shall be granted by Congress, to our principal consulates. To enable the Bureau to prepare such an index, the Department is sending out blank forms, and manufacturers are requested to fill in these blanks and furnish briefly any additional information which they may desire to have recorded in connection with their business.

The usefulness of such a body of information placed on record can readily be understood by manufacturers. It must be remembered, also, that foreign merchants attach special importance and value to information obtained through official sources.

Construction News.

Readers of the JOURNAL are requested to inform this Department of pending contracts, or of new work projected, giving name and address of the person in charge of the work or project.

Fredericktown, Pennsylvania.—La Belle Co., of this place, will build a 600-ton coal washery.

Sandpoint, Idaho.—The Panhandle Smelting Co., of this place, expects to make further additions to its plant.

Sumter, Ore.—The Heppner Mining Co., of this place, will install a stamp-mill and sawmill. D. B. Stalter is president.

Bingham, Utah.—The Boston Consolidated property at this place will have large steam shovels installed in the near future.

Cañon City, Colo.—Lewis G. Rowand, of Denver, Colo., has plans for the erection of a smelter at this place under advisement.

Kewanee, Ill.—The Kewanee Mining & Manufacturing Co. is preparing to rebuild its old plant, which was destroyed by fire last winter.

Coffeyville, Kan.—The Ozark Zinc Oxide Co., of Joplin, Mo., is letting contracts for the construction of a zinc oxide plant at this place.

Silver City, New Mexico.—The Comanche Mining & Milling Co. will soon contract for the erection of a briquetting plant at this place.

Deadwood, S. D.—The owners of the Victoria property, near this place, are contemplating the erection of a mill of 200 tons capacity.

Jamestown, Colo.—The Monarch Consolidated Gold & Copper Co. is reported to intend building a mill for its Wano mines at this place.

Viola, Okanogan County, Wash.—Joseph Coleman, of the Viola Gold & Copper Mining Co., is coming east to purchase machinery for its works.

Cherryvale, Kan.—The Edgar Zinc Co. is making tests to determine whether or not to erect a large acid plant in connection with its smelter at Cherryvale.

Radford, Va.—The Virginia Iron, Coal & Coke Co. contemplates the erection of a new 200-ton furnace at this place and the enlargement of its old furnace.

Evanston, Wyoming.—Robert S. Spence, of this place, and Warwick Saunders, of Davenport, Iowa, are to install machinery on their coal properties, 22 miles from this place.

Grand Encampment, Wyo.—The Penn-Wyoming Co., of this place, intends to make additions and improvements to its smelter. It is intended to double the present output.

Los Angeles, California.—The Downing Consolidated Mining Co., of this place, intends next month to begin the erection of an air compressor plant and mill at mines at Hornbrook, Siskiyou county, California.

Chilpancingo, Guerrero, Mexico.—The Melgarejo mine, near this place, is apt to have a new concentrating plant. A. S. Witherbee and M. Lennen, of Mexico City, are interested.

Luray, Virginia.—H. F. Brinton is organizing a stock company to operate mines at Stony Man mountain, 7 miles from this place. Reduction machinery and a cableway will be required.

Tapalpa, Jalisco, Mex.—The Chatterton Mining Co. will erect a 20-ton reduction plant in this district. The company's headquarters is Springfield, Ill. N. W. Kinross is general manager.

Eureka, Utah.—The Yankee Consolidated Mining Co., headquarters at Salt Lake City and mines at Eureka, Utah, will soon be in the market for a milling plant. L. A. Amsden, of Salt Lake, is manager.

Wheeling, West Virginia.—The Youghiogheny & Ohio Coal Co. will open the mine on Glenn's river within 60 days, according to the statement of Mr. Osborne, the manager. The company is building a new tipple at its Maple Hill mine.

Idaho Springs, Colorado.—The Fostoria Gold Mining Co. will install new machinery on its property in the Pleasant valley district; operations to be carried on through the Silver Gem tunnel. W. E. Campbell, Idaho Springs, is manager.

Nanticoke, Pa.—The Delaware, Lackawanna & Western Coal Co. will erect at Butzback's Landing, near this place, a power plant to furnish electricity for the Avondale, Auchincloss and Bliss mines. George Montgomery, of Scranton, is in charge.

Roanoke, Va.—It is reported that a new steel mill of large capacity is to be established at this place. E. C. Wills, of New Jersey, represents the syndicate which has the enterprise in contemplation. It is stated that $1,000,000 capital has already been subscribed.

Hancock, Mich.—The Copper Concentrating Co. will build on the shores of Torch Lake at Mason, 6 miles from this place, a reduction plant for treating tailings. It is to have a capacity of 200 tons per day, and construction work is expected to begin early in September.

Reno, Nevada.—W. D. Arnett & Co., of this place, ask for catalogues on large ditch construction, construction of large power dams, concrete work, hydraulics, water-power plants, electric-power plants, electric-power transmission and electric-power distribution. They are constructing a large power-plant.

Black Hawk, Colorado.—A. E. and W. Hampson, formerly of Telluride, Colo., have arranged to install a large plant for the treatment of the tailings on North Clear creek, below Black Hawk; their plant to be equipped with 16 Wilfley tables, 6 frue vanners and 150 canvas tables. They will have the tailings from 8 stamp mills.

Central City, Colorado.—J. H. Heinz, of New Marion, Ind., has taken a lease and bond on the Gladstone and Firenzi claims, in Illinois Central district, and is going to install machinery and add to the buildings. The property has produced some very good grade smelting and milling ores. Henry Ehrhardt, Central City, Colo., is manager.

Haileybury, Ont. — The Drummond Mines, Ltd., are arranging for the erection of a sampling and concentration works for the treatment of silver ore. The ore will be transported from the mine in the Cobalt area down Cross lake and Far creek to a siding of the Timiskaming & Northern Ontario Railway between Cobalt and Haileybury, where the works will be located.

Empire, Colorado.—The Benze Investment Co. is making plans for the installation of a larger plant of machinery at the Conqueror group of claims at Empire, the installation of an electric plant at the mill, and the increasing of the daily capacity from 30 to 100 tons per day. W. Ballantyne, Empire, is manager.

The Charter-Raton Mining & Milling Co., operating near Empire, is planning increased operations and the installation of machinery. G. H. Morris, Empire, is manager.

Russell Gulch, Colorado.—The Russell Mining Co., with Kansas, Missouri and Pennsylvania capital, is interested in a group of claims in Russell district, and operations have recently been resumed at its main shaft, and arrangements are under way for the installation of a plant of electric machinery. Frank Paxton, Russell Gulch, is manager.

The Fairfield Gold Mining Co. will erect a new shaft-building, 45 by 40 ft., on the Fairfield mine in Russell district; new machinery is to be installed to replace the machinery destroyed by fire. Baltimore, Md., parties are interested, with W. M. Nickerson, 315 Opera House Building, Denver, as manager.

Republic, Wash.—The Belcher Mountain Railway Co., Ferry county, Wash., has ordered 400 tons of 35-lb. steel rails from the Illinois Steel Co., of Chicago, to be rolled at that company's mills at Milwaukee. About 100 tons of re-laying rails were purchased for sidings. The company has also purchased a 35-ton consolidation locomotive, suitable for steep-grade traction; also box, flat and ore cars and other equipment.

The Belcher Mining Co., Republic district, reports having purchased an 8-drill electric plant, the dynamo to be driven by a gasoline engine now in use. This company reports also having purchased equipment for electric lighting.

The Winnipeg Mining & Milling Co. also reports having purchased an 8-drill electric plant for the Hawkeye mine.

Special Correspondence.

San Francisco. Aug. 16.

The most recent mining strike in California, attracting any special attention, is one in a farming and stock-raising country near Fort Bidwell, Modoc county, the northeasterly county of the State. In an abandoned tunnel some prospectors, after a little work, found a vein of free-gold ore. In another instance in the same locality a young sheep-herder found a small vein of free-gold ore. Other claims have since been located. The district where these veins are found is mountainous and at high altitude, where there is an abundance of timber and water. There are extensive lava beds covering a large portion of this county, which is one reason why so little prospecting has heretofore been done. It has always been supposed that the gold belt in Plumas and Lassen counties continued on through Modoc county into Oregon, but the presence of so much lava in the surface has discouraged prospectors.

The iron ore deposits recently acquired by the new Western Iron & Metal Co., in San Luis Obispo county, are on the property of B. P. Prefumo and adjoining ranches. Two miles of railroad will connect the mines with the narrow-gauge railroad already running, and the whole haul to tidewater at Port Harford will be only eight miles.

A small amount of bismuth is now being mined in California, from a deposit owned by John G. Lang, of Banning, Riverside county. The claim is 55 miles east of Banning, near the Lost Horse and Desert Queen mines. Some 20 or 30 tons of ore were recently shipped. A new bauxite deposit not far from the railroad line, in Shasta county, has been sold to the Pittsburg Aluminum Co. Thus far no bauxite deposit has ever been utilized in this State. There are only two or three known occurrences of bauxite in California. Three molybdenum deposits have recently been located by E. E. and T. S. Grider, of Porterville, Tulare county, about two miles south of Nelsons, in the same county. The properties are being opened. California is already producing, on a commercial basis, 45 mineral substances, and to these should shortly be added iron, bauxite, bismuth and molybdenum, if these new fields are brought to a producing stage. Tungsten is already being mined in the region about Randsburg, Kern county, where quite a number of locations are being opened.

The cutting of the McCloud river trail from Sim's station, 16 miles across the Sacramento divide to the newly built summer homes of certain rich San Francisco people on the McCloud river, is opening up a mineral section in Shasta county hitherto unprospected. The trail is to be widened to an automobile road, and in cutting it the dense brush is being removed and the hillsides being excavated. Already seven well-defined ledges have been discovered in the prosecution of this work—gold, copper and galena.

It is now proposed by the Government to condemn and utilize Indian valley, in Plumas county, for a storage basin for water to be used in the irrigation of lands in the Sacramento valley, 80 miles distant. The plan is to dam the Little Feather river, holding the water from the stream in the valley, a natural reservoir. The construction of a dam less than 900 ft. long will form a reservoir 20 miles in length, with an average width of about 5 miles. In the valley are located the towns of Taylorville, Greenville and Crescent Mills, in addition to many rich farms and numerous mines. Around Taylorville and Greenville are numbers of partly developed copper claims on which the owners are at work. There are also near the three towns named many gold-quartz claims, more or less developed

The boundaries of the Sierra forest reserve have been considerably changed by a proclamation issued by the President enlarging the reserve at various points. The most important of the additions are two tracts containing about 317,000 acres, lying along the eastern boundary, mainly in Mono and Inyo counties, which contain a portion of the highest section of the Sierra Nevada and some of the contiguous foothills, forming the watersheds of the Owens river and other streams. A further addition of 79,360 acres was made on the eastern boundary of the reserve by including the greater portion of the abandoned Mount Whitney military reservation in Inyo and Tulare counties. This is the mountain area forming part of the highest of the Sierra and containing Mount Whitney and two other peaks, over 14,000 ft. high. The largest of the additions made upon the western boundary contains a tract of about 116,000 acres of Tuolumne and Mariposa counties, situated mainly on the watersheds of the Tuolumne and Merced rivers, adjoining the western portion of the lands which were excluded from the Yosemite National Park, and made part of the Sierra forest reserve by Congress in February last. Through this section a number of mining properties are being worked.

The Oroville Dredging Co., of Butte county, this State, has leased certain large tracts of land on the Applegate river, near Grant's Pass, Ore., where dredging operations are to be conducted if the drills prove the ground to be sufficiently valuable.

The Cowboy mine, one of the old properties at Amalie, in Kern county, has been sold to Los Angeles men for a reported price of $180,000 The mine has paid for its own development and has been shipping its ore to the Selby Smelting Works for reduction. It is of such character that the values cannot be recovered by ordinary milling process.

A company has been formed to work the river bed mining claim on the middle Yuba river near the Delhi mill. There is a horseshoe bend at this point and it is the intention to divert the water so as to leave about half a mile of the channel bare. Some years ago this claim was worked by Poorman & Hastings.

F. M. Smith, of the Pacific Coast Borax Co., has stopped work on the railroad he was building from Las Vegas, New Mexico, to the Bullfrog district, in Nevada, being unable to make satisfactory transportation arrangements with the Salt Lake railroad.

The Forest City Mining Co., which owns 6,000 ft. of Chipps ridge, between Wolf and Kanaka creeks, Sierra county, is running several tunnels to develop the channel. The quartz gravel channel lies under the lava-capped mountains, extending from the head of Jim Crow cañon to the Plumbago mine, owned by the Croesus Mining Co., of Alleghany. This channel lies about 4 miles directly east of and parallel with the gravel channel worked by the Bald Mountain Co., which yielded to that company $1,720,000 in dividends; portions of this latter channel were also worked by several other companies operating in the vicinity of Forest City. As soon as the necessary surveys can be made the force of men will be doubled, so that the channel can be sufficiently opened up to permit of mining the gravel on an extensive scale. The necessary dumps, reservoirs, flumes, etc., have already been built, and the company is ready to begin washing gravel as soon as the main tunnel can be extended to a point under the channel and an upraise made for the purpose of extracting the gravel. Gravel has already been encountered in an upper drift and considerable channel gold extracted. In running the main tunnel a fine looking quartz vein was cut and prospected 8 ft. between the walls.

Butte. Aug. 15.

North Butte Copper is re-timbering its shaft from top to bottom, but the work is not interfering with the extraction of ore. The company has arranged with the Anaconda Co. to do its hoisting through the High Ore while the work is in progress. The two mines are connected at a depth of 1,600 feet.

Fred. J. Rowlands, Butte agent for the Allis-Chalmers Co., and trustee for the property of the Blue Bird Co., Ltd., is attempting to effect a reorganization, with a view of a resumption of operations on the property, three miles west of Butte. All of the owners of Blue Bird live in Europe. Mr. Rowlands visited that country recently and laid the matter before them. The Blue Bird has not been operated since 1893. It owns several claims containing silver-gold ore and had a 90-stamp mill, but the latter has been torn down and sold.

The Western Mining Enterprise Co.,

composed of Eastern men, is developing the Gold Hill property, 45 miles east of Butte. The work is being directed by Charles A. Van Zandt, brother of Ferdinand Van Zandt, formerly manager of the Blue Bird property.

United Copper is shipping some ore from its Belmont mine, the development of which up to date has cost about $275,000. The vein is not wide, but the ore is of good quality. The Minnie Healey mine, one of the principal producers of the company, is again in operation, after a suspension of 10 days, the result of an accident in the shaft. The Corra is also in operation, following a shut-down of two weeks on account of improvements.

Amalgamated is keeping up its daily production of 10,000 tons, although the output of its Leonard and Colusa mines was curtailed somewhat last week by the failure of the Great Northern Railroad Co. to empty the bins.

The output of the Pittsburg, 90 tons per day, is being maintained. The company will not start its smelter again until the arrival of its new blower from California.

Salt Lake City. Aug. 15.

The stockholders of the Dexter Tuscarora Consolidated Mining Co. have ratified the action of the board of directors in bonding the property of that company to J. H. Mayham, of Denver, for $100,000. The first payment, $5,000, has been made and the balance will be due by July 1, 1906. New and powerful pumps are beng added to the equipment to unwater the mine preparatory to sinking the shaft 200 ft. deeper. The property is at Tuscarora, Nevada.

The Rio Grande Western has commenced the construction of the branch line, 18 miles long, to the Garfield copper smelter of the American Smelting & Refining Company.

The Utah Copper Co. has surveyors on the ground selected for the site of its proposed concentrating mill near the old Garfield beach resort on the south end of the Great Salt Lake. Contracts for the excavations will commence during the coming week.

The defendants in the smelter smoke cases filed their answers in the Federal court this week. The plaintiffs are farmers and others, who claim they have suffered damage because of the poisonous gases coming from ore while in the process of smelting. The Bingham Consolidated alleges in its answer that it owns and operates no smelter in the Salt Lake valley at the present time. The fact is, the plant is doing business in the name of the Bingham Copper & Gold Mining Co.; simply an error in the complaint. The Utah Consolidated contends that the damage to vegetation has been greatly overestimated, yet admits some damage. The company, however, has been conducting a series of experiments at an expense of over $100,000 and they are promising success. It is alleged that the taxes of this one concern are over $26,000; 750 men are employed, while the payroll exceeds $56,000 per month. The United States Smelting and the American Smelting & Refining companies claim that the farmers have no legal right to sue, because they have stood quietly by and allowed the investment of millions of dollars and allowed the plants to run unmolested for a long period of time. The United States Co. says it employs 1,000 men in its smelter and mines, and over 300 more in various departments and actually furnishes support for 5,324 persons; that engaged in mines which sell their ore to the smelter are 3,667 persons, upon whom are dependent 13,068 people. The annual payroll of the United States Co. in all its mines and smelter aggregates $952,000, while the men who work in the mines which ship ore to the smelter receive annually $4,270,000. All four of the defendant companies say that several months have been spent in making experiments, and confidence is expressed that by the time another season comes for the putting in of crops a solution of the problem will be at hand.

Denver. Aug. 18.

The secretary of the American Mining Congress, which has recently established its headquarters here, has left for Portland, to attend the annual convention of the Trans-Mississippi Commercial Congress, where President Richards, of the former body, will make an address on the desirability of the United States Congress establishing a department of mines and mining. The call for the next annual convention has been issued; it will be held Nov. 14-18, at El Paso, Tex.

From all appearances, several of the large mining companies operating in the Cripple Creek district will, before long, construct their own plants for the treatment of their ores. The Golden Cycle Mining Co. for some time past has owned over 60 acres of land at Colorado City, adjoining the Telluride plant, and it is probable that its plant will be built there. It will be a modern cyanide plant, of a capacity of from 200 to 300 tons daily, and the cost will be about $350,000. For a while it was thought that a sale of the Telluride mill to this company was a probability, but the plan was given up, as the necessary alterations would be too expensive.

Former President Bettman, of the Independent Smelting & Refining Co., which owns the smelter at Golden, is at present in the East, reorganizing that company, and hopes to resume business there before long. The plant has been idle for about three months.

In the district court of Teller county, Attorney Frank J. Hangs has brought suit against a number of prominent men in the Cripple Creek district for $135,000 damages, on account of his deportation a year ago.

The product of the Portland Cement Works is finding such a large sale that the capacity will at once be enlarged from 1,500 to 2,500 bbl. daily.

At Pearl, which is situated very close to the Wyoming line, in Lorimer county, the new smelter, of about 150 tons daily capacity, is very nearly completed, and before October it will probably commence operations. At first the copper matte will probably be converted into pig copper at the Penn-Wyoming smelter at Encampment, Wyoming. It is probable that, as soon as a market for the ores has been established, a number of properties will be started up in the Pearl district.

In Fremont county the Colorado Fuel & Iron Co. is making considerable improvements at its coal properties. At Rockvale electricity is being installed in place, which will increase the output largely.

On account of differences existing for some time past with officers and stockholders of the Big Five Co., Mr. H. C. Merrill, who has been secretary of this company for many years, has withdrawn, and the minority stockholders will rule, although Mr. Merrill is said to own more stock than all others combined.

The new extension of the Denver & Rio Grande railway from Durango, Colo., to Farmington, N. M., will be completed about Sept. 15. About 26 miles of rails have been laid, and there remains about the same distance, the grade being completed.

The minority stockholders of the Bonny Nell Merger Mining Co. will probably contest the reorganization of the company.

Duluth. Aug. 19.

Stripping records have been made with regularity this year by ambitious crews. At the Adams mine stripping the other day an exceptionally good record was made by shovel runner J. W. Walters, who loaded 820 dump cars in the day shift of 10 hours. But this was beaten on the subsequent night shift by runner A. C. Sisson with 860 cars. These cars hold a ton, or two yards of dirt in place. Sisson's record means that the dipper must average 86 loads per hour for the full time, without regard for accidents or shifting cars.

Tremendous rains stopped all open pit work at mines near Hibbing again last Thursday, and the amount of ore taken off the range has suffered in consequence. These rains filled the Burt open pit so that three shovels were submerged, drowned the pumps and underground workings of Leonard and Monroe-Tener, covered the latter's shovels, poured a river into Stevenson pit, and flooded the Morris and several other mines. There has never been a more sudden and severe rain storm in the history of the range. Work has been hampered all summer by exces-

sive rains, and a month ago many mines were closed down for a week or so from that cause. That the output can be maintained at so great a volume is an indication of the splendid reserve power of the Mesabi mining management, and the extent of ground they have blocked out ahead of their daily shipments.

The Oliver Iron Mining Co. has just paid $70,000 for a tract of timber lands in Alger county, Mich., for the use of its mines on the Marquette and Menominee ranges. This tract will be held as a reserve supply and will not be drawn upon for a long time. The policy of the company has been to secure timber lands on all ranges, and it is now in possession of an immense quantity. One tract on the Mesabi bought by it for $500,000 less than two years ago, might now be sold for $750,000; indeed the company has refused that sum for it. Other lands tell the same story of increased values.

The Consumers' Ore Co., Mesabi range, has closed down one of its two mines near Buhl, and will not ship from it this year. The other mine is working steadily and will make a large product.

Fire in the Cambria mine, Negaunee, has been extinguished, and the shaft opened. It is probable that the upper part of the shaft lining is ruined, and that the mine can ship no more this year.

The Cleveland Cliffs Iron Co. has taken possession of a large tract of land near Swanzey, including the Princeton mine, formerly operated by Tod, Stambaugh & Co., and will develop the ground extensively. This company is steadily extending its operations and increasing its holdings on old ranges, but is paying very little attention to the Mesabi range; its few attempts there have been rather unfortunate and have resulted in little ore. But its influence on the Marquette is increasing, and if its later purchases result as hoped, its future value can scarcely be measured. The company has recently taken over the old Ogden mine, near Ishpeming, and is developing several properties elsewhere that look promising.

The Duluth & Iron Range road is beginning experiments with steel ties, and has laid some of them along the big hill out of its ore terminals, where the traffic is exceedingly heavy, and where the test will be severe. It will be a long time before the result of this experiment can be made known.

Strikes have occurred at the Newport mine at Ironwood, and it and the Bonnie shafts have been idle. Miners wanted an increase of pay corresponding to what the trammers were given, though the latter are still paid less than miners. The tendency is for Lake miners and trammers to come closer together in rate of pay, and perhaps to come finally to an equal scale, as is the case in western camps, but the miners do not appreciate the justice of this change, and hence the strike. Six hundred men who had been getting $2.10 went out for an increase of 15c. per day.

The Penn Iron Mining Co is soon to begin the long contemplated improvement of Sturgeon river, in order to obtain power for the operation of its mines hydro-electrically. This will be a costly undertaking, but will save the company a large sum annually.

Drills are being added to field operations on the new Cuyuna iron range, west of Duluth, and there will be a dozen or more there in a few weeks. Aside from some work under way by G. H. Crosby, of Duluth, at Rabbit lake, some miles north of the range proper, nothing has yet been found that seems to be of great commercial value. At Rabbit lake Mr. Crosby has ore that runs well and seems to be quite hard. If his find extends in area, with a quality holding to what he has been so far able to show, he will have made an important discovery. His operations are attracting many others to the field and there is a genuine old-time boom thereabouts.

Platteville, Wis. Aug. 18.

Zinc-mining men in general are awakening to the fact that there are great opportunities afforded by the mines of this district. Frank Nicholson has numerous investments here, chief among them being the Mills property, located in Grant County, adjoining the Hoskins mine. The development is under the management of Ralph Root, formerly of Joplin. The property consists of a 40-acre lease, the fee to which is owned by Madison parties, Governor La Follette owning one-quarter.

A majority of the mines in the Platteville district have barely enough water coming from their levels for their concentrating plants. It is often necessary to drill a well for water, which is always found under the clay-bed which underlies the stratum locally known as the "oil rock." Many of the concentrating plants depend wholly upon the streams for water.

A comparison shows that while the monthly production of the Joplin district is high when the area is considered, it it seems small when compared with the output of the two principal producers of the Platteville district, the Empire and the Enterprise; each producing in one week a tonnage exceeding many of the different camps of the Joplin district. This production of high-grade marketable ore has been made possible through the use of the electro-magnetic ore separator. Two years ago many of the mines that were producing high-grade ore began to get an ore containing iron pyrite, or chalcopyrite, which made it impossible to market the same at a profit. The use of the magnetic separator assured the commercial success of low-grade propositions, as the quantities are unlimited. Since the mines in the Highland and Linden camps passed into the hands of the New Jersey Zinc Co., eastern parties are coming into the district and many of the large properties are going to men who are erecting and installing modern machinery for the preparation of the ores. The New Jersey Zinc Co. has built a railroad connecting its different holdings in Highland and Linden camps with the oxide works at Mineral Point, Wis. This road is 30 miles in length, and incidentally touches other mines and will be the means of opening up a territory that has hitherto been neglected, as it was almost impossible at times for teams to get to it.

Scranton. Aug. 19.

The Philadelphia & Reading Coal & Iron Co. has just struck a number of thick veins of Lykens Valley coal at its colliery in western Schuylkill. W. J. Richards, general manager of the company, who is a mining engineer of long experience, has personally directed the hunt for these veins.

The miners employed at the Black Diamond colliery at Simpson went out on strike on Monday morning. The strike was declared at a meeting held on the Saturday, after negotiations to adjust alleged grievances failed. The principal grievance as presented by the men concerns the sliding scale. From July, 1904, until April, 1905, the company has paid its miners on the net, instead of the gross earnings, in violation, it is said, of the award of the Strike Commission. The second grievance is that two men were discharged without cause, although the superintendent of the mine declares that they were discharged because they would not clean their coal properly. A request was made that the men be reinstated, but this was refused. A third charge was made that there was a discrimination in the distribution of cars, and that the miners are subjected to excessive dockage.

It is stated on excellent authority that the syndicate acquiring coal lands in the Pottsville territory is backed by the Delaware & Hudson Co., which is desirous of extending its system further south and of purchasing additional coal properties in order to increase its shipments.

The long-standing grievances of the Erie and Hillside colliery employees are still occupying the attention of the men. They held a convention in Scranton on Monday, in which the matter was again threshed out. The principal grievance of the miners is that of the check-weighman and docking bosses at the mines. After a prolonged debate it was decided to appeal once more to the company officials for the purpose of reaching an amicable adjustment of the difficulty. The company claims that where a majority of the miners have applied for a docking boss and check-weighman they had been appointed; but it refuses to appoint these officials on behalf of the men where such application is not definitely made.

A driver boy at the Pancoast mine last Friday took a trip of empty cars to the shaft and was preparing to run them on the carriage. The gate operates automatically when in working order. On this occasion it was not in order and the boy was precipitated to the bottom of the shaft 400 ft. below. This is not an infrequent accident at the mines. To obviate it, it is suggested that, when the carriage is in its proper position, a semaphore arm, something in the form of a railway signal, should indicate its presence, and the absence of the arm should warn anyone working around the shaft of the danger of approaching it.

It was generally expected by the miners in this section that the President would make some announcement on the industrial situation in the anthracite coalfields. He carefully refrained from doing so. Mr. Roosevelt was much more interested in the sociological condition of the mine workers than he was, or appeared to be, in their present or prospective grievances. From those among whom he made personal inquiries, he wanted to know whether the domestic condition of the miners had improved since the last strike. He was told that it had materially; but that the unfortunate drinking habits among a considerable section of the foreigners had rather increased than decreased in the meantime. He was, however, gratified by the fact, of which he could see such a practical demonstration before him, that nearly all the younger generation of mine workers are total abstainers.

William R. Storrs, who died last week, had been for many years coal agent for the Delaware, Lackawanna & Western. He was a pioneer in the development of the coal industry in the Lackawanna valley, and was highly esteemed as an enterprising and conscientious official.

All the collieries of G. B. Markle & Co. resumed work on Monday, except No. 5 Jeddo. Extensive repairs are under way at this colliery, which it is hoped will be completed soon.

Objecting to the inside foreman's appointment of a new driver boss, the patchers at Maxwell No. 29 colliery, of the Lehigh & Wilkes-Barre Coal Co., went on strike on Saturday, and as a consequence the mine is idle. The patchers, who assist the drivers, came to the conclusion that the new boss did not deserve the position, there being older and more experienced men.

Two mortgages were placed on record at Pottsville on Wednesday. One is from the Crystal Run Coal Co., of Pottsville, to B. W. Cumming, trustee, for $500,000, to secure an issue of bonds in that amount. The other is for a smaller amount for a similar purpose for coal property in Mahanoy City.

The Pottstown Iron Co. has leased the old Middle mines to a New York syndicate. It is 15 years since mining ceased there.

The report that the track of a human foot was found in a piece of coal taken from a mine at Pottsville, and afterwards thrown into the chute where it was destroyed, is ridiculed by local geologists and mineralogists. They say that all kinds of fanciful outlines may be observed in the coal mines. Nevertheless, they regret that that particular piece of coal was not subjected to a scientific examination.

The Delaware & Hudson Co. has leased a portion of its coal dumping grounds at Honesdale to the Erie for an indefinite period. The Erie will begin storing coal there this week. The Delaware & Hudson has 15,000 tons of coal stored there that has not been disturbed during the past year.

Toronto. Aug. 19.

One of the Ontario Government diamond drills is resuming work at Lake Temagami on the iron outcroppings on the property owned by T. B. Caldwell and others. Another is being shipped to the neighborhood of Port Colborne, Ont., to test the limestone deposits in that locality.

As the result of a detailed examination of the mines of the Dominion Coal Co., at Sydney, N. S., by James Ross, president, assisted by an English mining expert, the working of the south slope in the new Dominion No. 6 colliery has been abandoned, and it has been decided to tap the Emery seam at the Reserve colliery, and to work it on the longwall system, which may be largely adopted in future.

The following mining companies have been incorporated under the laws of Ontario: Kerr Lake Mining Co., Ltd.; head office, Toronto; capital, $40,000; provisional directors, Edward Steindler, David M. Steindler, Joseph J. Steindler, Wm. J. White and Jacob A. Jacobs. New Ontario Ore Refining Co., Ltd.; head office, Toronto; capital, $500,000; provisional directors, Thomas H. Barton, Oscar F. Taylor and Arthur W. Barton.

Victoria, B. C. Aug. 14.

Railway construction, which when completed will benefit several mining districts in the province, is in progress. In Northeast Kootenay, grading has been commenced on a line known as the Kootenay Central, which is understood to be under the control of the Canadian Pacific. It will run between that company's main line, at Golden, and its Crow's Nest line, south of Fort Steele. It is intended to follow the valleys of the upper Columbia and upper Kootenay rivers. In the mountains bordering these valleys are mineral deposits that, with suitable transportation facilities, can be profitably worked, notably several silver-lead mines in the Windermere mining division that have during recent years shipped to Kootenay smelters sorted ore in quantity.

In Southeast Kootenay a line is being built between the Canadian Pacific Crow's Nest road at Yakh, and Spokane, Wash. This branch will be in competition with the Great Northern Railway Co.'s line between Spokane and the coal-fields of the Crow's Nest Pass.

A commencement has been made, on a small scale, grading a line from Grand Forks, Boundary district, where is situated the Granby Co.'s big smelter, northward up the north fork of Kettle river. This work, though, is understood to be preliminary, pending an application to the provincial legislature for a subsidy. The line is designed to provide an outlet for the ores of Franklin camp, in which are the McKinley, Glouster and other properties.

The construction of the road known as the Victoria, Vancouver & Eastern, the charter of which has been acquired by the Great Northern Railway Co., is at last proceeding in earnest. This is an extension of the Great Northern Co.'s branch line from Marcus, or the company's Spokane Falls & Northern to Republic, Wash., by way of Grand Forks, B. C. Grading from Curlew, Wash., to Midway, B. C., was completed some time ago, and now the rails are to be laid on this section. Contracts have been let for grading and rock-work between Midway and Oroville, Wash., and thence to Keremeos, B. C. Engineers are making the final location of the route from Keremeos up the Similkameen river to Hedley, where the Daly Reduction Co.'s 40-stamp mill is running on gold ore from the Nickel Plate mine, on Twenty-mile creek, owned by the Marcus Daly estate. The Great Northern Co.'s plans include the continuation of this railroad up the Similkameen river to Princeton, in the neighborhood of which town are seams of coal of commercial value, and on Copper mountain, bornite and other copper ores of much promise. One group of mineral claims on this mountain is under bond to the British Columbia Copper Co., of New York, which, after having established a profitable copper-mining and smelting enterprise at Greenwood, Boundary district, is seeking to extend its permanent operations to the Similkameen country.

From the northward the Canadian Pacific Railway Co. is building a branch from its main line, at Spence's Bridge to Nicola, in which extensive district are coal measures and occurrences of metalliferous minerals, in addition to a comparatively large area of agricultural and pastoral lands. An extension of this branch southward to Princeton and Hedley and, later, connection with the company's Columbia & Western system in the Boundary, are understood to be included in its plans.

Still another mining section in which a beginning has been made is that part of the Boundary district through which the west fork of Kettle river flows. The absence of transportation has prevented in

this locality development adequate to demonstrate on a fairly large scale the production capabilities of the West Fork mining camps. In 1901 one mine, the Carnie, shipped 885 tons of silver-gold ore, half the distance over a snow-road, 50 miles to Midway, whence it was taken by rail to the British Columbia Copper Co.'s smelter at Greenwood. Returns from this ore gave an average value of between $40 and $50 per ton, but the cost of hauling to the railway was so high that the mine was closed down. Last year a small stamp mill and a concentrating table were put in and experimental work was done. Other properties in this neighborhood that have shipped sorted high-grade ore are the Sally, Rambler and Butcher Boy. Prospecting work has indicated the occurrence of shoots of ore of payable grade on other mineral claims in this district, which will probably prove a good mining camp when means for shipping ore at moderate cost shall have been provided. It is stated that the banking firm of Kuhn, Loeb & Co., of New York, is arranging to finance this undertaking, which is known as the Midway-Vernon railway project.

Yukon Territory. Aug. 4.

The president of the White Pass & Yukon Railway said in a recent interview: "We have handled more tonnage this year than in any previous season. The Dawson trade shows an increase in heavy machinery, though there is a falling off in some other lines. In Fairbanks we have practically a new camp, and, of course, it has brought a considerable increase of trade."

Improvements are being made on the White Pass Railway. Two new steel bridges are being placed in position and a third one is completed.

This is the driest season on record, and there is very little water in the creeks. Plants that have been worked by damming the creeks and pumping the water are unable to continue operations. Bonanza, Eldorado, Hunker and Dominion creeks are not giving half a sluice-head. The reason given for the shortage of water is that last winter the snowfall was very light in the Yukon, and the great heat prevailing recently caused what snow there was to melt quickly and rush away in a short time. The Yukon river has been higher than in other years, the heat having melted the glaciers to a greater extent than in ordinary seasons. It is the contention of many mine-owners that unless the Dominion Government devises some means of providing water on the creeks, the gold output of the Yukon will in future years be much reduced.

Since the fire that destroyed so much property at Whitehorse a short time ago, that town has been re-built and presents a more substantial appearance than before. The place is prosperous and the outlook is encouraging. Prospecting is being done with considerable energy in many cases, and some mining is going on, though not on a large scale, available capital being limited.

Mining operations on a quartz property in the Little Windy Arm country, on the upper Yukon, 10 miles from Caribou crossing, on the White Pass & Yukon Railway, are to be prosecuted with great vigor, if reports may be depended upon. J. H. Conrad, who is at the head of the enterprise, is credited with the statement that a mining plant to cost $100,000 has been ordered and the work of construction of a 4-mile tramway commenced. It is stated to be the intention to employ 300 to 500 men through next winter, and that after the property shall have been opened up a daily production of 100 tons of gold-silver ore will be practicable. The lode is described as quartz, of considerable width and known to be continuous for a long distance.

At the Tantalus coal mine, on the upper Yukon, 15 men are employed getting out coal for the White Pass steamers, several of which burn coal as well as wood. Coal is also being mined on the lower river—at the Coal Creek mine, below Fortymile, near Nulato, and on Roy creek, below Eagle. A traction engine, to be used in hauling coal to the river bank, has been sent down the river.

A quartz property opposite Dawson, owned by the North American Transportation & Trading Co., is showing up well.

The newly appointed Commissioner for Yukon Territory has returned to Dawson from an extended trip to mining camps on the various creeks. He went as far as Granville, on Lower Dominion, and was everywhere well received by the miners.

The construction of the Klondike Mines Railway is being hindered by applications for injunctions to prevent its continuance. Applicants allege that the grading of the railway across their respective properties causes considerable damage, and they ask for compensation.

July 27 was the warmest day of the season, the thermometer on that day registering 83° in the shade. As the coldest day last winter was 55° below zero, this gives a range of 138° in temperature. The temperature has been known to be as low as 71° below zero at Dawson, so that 154° is the greatest range noted.

London. Aug. 12.

Your readers will no doubt remember the Smelting Corporation, which was formed some seven years ago, to work the Fry zinc-lead process. The process proved a commercial failure, but the actual collapse of the company followed on the arrest and imprisonment of H. E. Fry on charges not connected with the business of the company. It was then found that large sums of money were unaccounted for and had presumably gone into Mr. Fry's private pocket. The company was then captured by John Peters, an accountant in the city, who had had more or less experience with copper companies. From time to time I have criticized the doings in connection with the policy of the company. Mr. Peters died recently and it was then found that additional sums of money had unaccountably disappeared since he obtained the control. In the various responsible positions that he held in connection with the company he was bound to obtain sureties, and these sureties have now been called upon to make good the deficiencies. The corporation is still doing a business of a sort in conjunction with certain companies owning properties in Chile. The corporation should have been wound up on the failure of the Fry process and its assets sold. Shareholders are fond, however, of throwing good money after bad.

For years now the London mining market has been hopelessly depressed, and the locking up of money in South Africans has been a potent factor in preventing the financial houses from taking up new ventures. In looking out for new countries to boom, many of the big houses have been attracted by the suggestions of mining men connected with South America, especially Chile and Bolivia. The instability of law and order in South America has always been a deterrent, but all the same large sums of English money are invested in nitrate, railway and waterworks companies on the west coast, and there is no reason why metalliferous mining should not have a chance. Recently I mentioned that one of the companies managed by Bewick, Moreing & Co. had taken an interest in a Peruvian company. Now it is stated that the Venture Corporation is acquiring options and the Farrars are also looking into dredging propositions, being advised by Mr. Cutten, the New Zealand dredging engineer.

Johannesburg. July 17.

Some timid mining people have been much exercised over the caving of sections of several mines. The Treasury mine, east of Johannesburg, has had a serious subsidence. Several buildings, including the manager's house, are in jeopardy. Sections of the tram line now hang in midair. Cracks appeared under the reservoir, and much of the water is running into the mine. Considerable damage was done to one of the shafts.

On the west, the Champ d'Or mine also had a serious subsidence. The ground had been on the move for a week, and when it commenced falling it came in rather suddenly, nearly entombing some of the men working underground. Although the subsidence in the Champ d'Or was extensive, little damage was done to the shafts. The caved section will be left to settle for 10 days or so, and then will be re-timbered. After these subsidences it costs a good deal to put the stopes in order again, but there is no danger of losing the mines.

General Mining News.

ALASKA.

KETCHIKAN.

Alaska Copper Co.—Late reports from Ketchikan are that the new smelter at Coppermount is now running and is handling 250 tons of ore daily. This smelter has been constructed by the Alaska Copper Co., which has mines at Coppermount. The power used in the smelter is generated by Pelton water-wheels of 600 h.p. The water is taken from Lake Mellen in the hills back of Coppermount. The company has a quantity of ore in the bins ready for the smelter. From the time the ore leaves the mines till it reaches the hearth of the smelter it is handled by gravity. A railroad 1,400 ft. long transports the ore from the mine along the ridge of Copper mountain to the top of the aerial tram, which delivers it to the ore bins right above the smelter. From the bins it is conducted by chutes into the furnace. There are 150 men employed in the smelter and mines. At present the ore is taken from the Indiana claim, the orebody of which has been stripped for over 250 ft. The ore from this mine is a green carbonate.

H. W. Mellen is president and manager of this company, D. D. Stewart foreman of the mines and C. W. Fuller is foreman of the smelter. Besides the property at Coppermount, the company has leased the Rush & Brown property at Kasaan bay and a ship is loading 700 tons at that place for shipment to the smelter.

ARIZONA.

COCHISE COUNTY.

Arizona Mines & Milling Co.—This company has been incorporated to work mines near Tombstone. The office is in that place, and the incorporators are F. D. McFerson, M. E. Langley and John J. Wyatt. The capital stock of the corporation is $1,000,000, divided into an equal amount of shares at the par value of $1 each.

Cochise Development Co.—This company has been incorporated with office at Bisbee, to work mines in that district. The incorporators are Joseph M. Muheim, C. L. Jones and Charles B. Watts. The amount of the capital stock is $1,000,000, divided into 100,000 shares.

Euclid Development Co.—This new company, with office at Benson, will work mines near that town. The incorporators are E. L. Thurston, E. L. Strong and Morse Fellers.

CALIFORNIA.

AMADOR COUNTY.

Gold Top.—This mine, at Pine Grove, will not be able to work by hydraulic process until the fall rains come, the water in the canal having given out just as the new flume was completed.

Markley.—This old mine near Volcano is being started up again. The mill from the Acme is being moved to it.

CALAVERAS COUNTY.

Gold Cliff.—The Utica Mining Co. at Angels is to lay a main from the compressor house at the Stickle mill to furnish compressed air to this mine.

INYO COUNTY.

Keeler and Swansea.—The Great Western Ore Purchasing & Reduction Co. is running 10 stamps at Keeler and 5 at old Swansea, and working slag from Cerro Gordo and the Swansea furnaces. Some will also be taken from the Darwin furnaces.

Bishop Creek Gold Co.—M. B. Kerr is making a careful examination of this property for Philadelphia and New York men, and is nearly ready to make his report.

KERN COUNTY.

Sunset Road Oil Co.—This company, incorporated in California last June with $2,500,000 of capital stock in shares of $100 each, has filed a mortgage with the Mercantile Trust Co., of San Francisco, as trustee, covering its property in the Sunset oilfields to secure an issue of $2,000,000 of 5% bonds, denominations $100 and $1,000, dated July 15, 1905, and due July 15, 1925. Amount outstanding, $417,500. The company is successor to the California Consolidated Oil Felds Co. and owns about 2,000 acres of oil lands and controls by ownership of stock about 2,500 acres of oil land leases; total active wells, 40; daily flow about 2,000 barrels. Of the capital stock (all common) $2,000,000 is outstanding. Interest on the bonds is payable Jan. 15 and July 15 at office of trustee. The bonds are subject to call to any amount on any coupon day at a premium of 0.5% for each year intervening between date of call and maturity; sinking fund ranges from ½c. to 2c. per barrel of oil handled and produced. No prior liens, it is stated, remain outstanding. The president is Charles B, Marks; secretary, N. A. Dodge. Office, San Francisco.

MERCED COUNTY.

Exchequer Mining Co.—This company (Miles O'Brien, superintendent) owns a group of claims on the Merced river, seven miles above Merced Falls, and, after doing development work several years, is now ready to put in machinery. The main tunnel is in 450 ft. A dam and power plant will be put in on the river.

Dredge.—L. K. Vaugh, of Oroville, Butte county, is about to use a prospecting drill in the bed of the Merced river near Snelling. Some 2,000 acres of bottom lands have been bonded by the company, which proposes to dredge, if the drill prospects are favorable.

NEVADA COUNTY.

Chicago Mining Co.—The new mill of this company, Nevada City, has been completed, and will be started on ore in a few days.

Idaho-Maryland Mining Co.—In the mines of this company at Grass Valley (J. G. Halliday, superintendent) the shaft has been cleared out and re-timbered to the 600-ft. level. Several tributers are at work in the drift on the 500-ft. level.

North Bloomfield Mining Co.—This company is preparing to sink a shaft on the old Milton gravel claim near Cherokee, and, if developments are satisfactory, the ground will be drifted. R. A. Thomas is superintendent.

McGrath Group.—The mines of D. McGrath, at North Bloomfield, have been bonded to Abel Johnson and Aug. Moberg for $20,000.

Federal Loan.—This mine, at Nevada City, is under a bond to a Portland, Ore., company, with F. L. Whipple as superintendent. Development work has been temporarily suspended, but the pumps are kept going.

Omega Placer Mining Co.—Members of the California Débris Commission have been inspecting this hydraulic mine, which has applied for permission to build a new débris dam in place of the one which went out last winter.

Shady Creek.—This hydraulic mine has started up under superintendency of W. G. Graham. The débris dam has been approved by the Commission.

PLACER COUNTY.

Forest Hill Divide.—The Channel Bend has nearly completed its new dam to replace the one washed out last year. The Paragon is working 25 men on good gravel. There is a report that work on the tunnel of the Sellier will be resumed. The Acacia, or James, mine has been sold by G. & H. W. McAuley to San Francisco men. The leasers of the old Red Point are doing well.

SHASTA COUNTY.

Dry Slide.—This mine, near Keswick, owned by Daniel McCarty, is to be reopened; this time work will be done through a shaft instead of a tunnel.

Mammoth Copper Co.—It is now stated that the smelter of this company will be blown in on Sept. 15. The heaviest machinery is already in place.

SAN DIEGO COUNTY.

Nobles Mines.—At these mines, Pine Valley, the stamps have again commenced dropping on ore left by the English company formerly in charge of the mine.

Cuyamaca Mining Co.—A Dow pump has been installed in the Stonewall to assist in unwatering the mine. The water is now out to the 500 level.

Gem Mine.—This mine, near Ramona, owned by Daggett & McIntosh, has been sold to Los Angeles men.

SAN BERNARDINO COUNTY.

Nelson & Moore.—This group of seven claims has been bonded to Wm. V. Holly and J. Meyer, of Los Angeles, for $60,000. The claims are near Kesler Springs, and were only recently located.

TUOLUMNE COUNTY.

Cosmopolite.—C. E. Lewis at work on a contract for unwatering this mine, and when this is completed active mining operations will be resumed.

Moorman.—This mine has been placed under bond to D. Newman and Ed. Harper.

Lucky Find.—In this mine, near Confidence, owned by Beamer & Allen, a winze sunk 20 ft. below the upper tunnel shows a vein of high-grade ore.

YUBA COUNTY.

Lone Cedar.—From this gravel mine, at Oregon House, the black sand carrying flour gold is being shipped to the smelter for treatment.

COLORADO.

GILPIN COUNTY.

Esculapian Mining Co.—Eastern and Denver parties are interested in the purchase of the Gibson group in Russell district. Machinery has been installed and active operations commenced. W. J. Blake, Central City, is manager.

Pearce Gold Mining Co.—A 20-h.p. gasoline hoist is being installed at the Sutton shaft in Russell district, and a new shaft-building is being erected. Denver and Eastern parties are interested, with H. G. Pearce, of Denver, as manager.

Goldfield-Homestake Mining Co.—Denver and Eastern parties are interested in a lease and bond on the Gold Retort claim in Nevada district, as well as in the Goldfield, Nev., district, and are arranging for the installation of machinery and a new building on their main shaft. Operations are being carried on through tunnel workings, and a fair grade of milling ores is being taken out. E. G. Straub, Bank Block, Denver, is manager.

Victoria-Phoenix Gold Mining Co.—Denver and Eastern parties are installing a steam plant of machinery on their Crown Point property on Buckeye mountain and are planning heavy work. W. Johnson, Tolland, Colo., is manager.

Saratoga.—The work of hoisting water was commenced this week, water standing in the shaft to the 450-ft. level; it will be lowered to the 750-ft. point, so that an additional working force can be put on. John Owen, Idaho Springs, is manager and heavy operations are planned, now that connections are to be made with the Newhouse tunnel.

East Notaway.—The Town Topics Gold Mining Co. has installed its hoisting plant and erected a new shaft-building to replace one destroyed by fire two months ago; a large amount of smelting ores is being shipped which have been broken in the working while the top work was under way. T. G. Martin, Central City, is superintendent, and the property is paying dividends under the leasing system of operation.

Hot Time Transportation, Tunnel, Drainage, Mining & Milling Co.—Idaho Springs, Colo., parties are interested in this organization with capital stock of $50,000; G. K. Kimball, Jr., of Idaho Springs, is manager. The company was organized for the purpose of driving a lateral connecting the Old Town workings in Russell district with the Newhouse tunnel. The distance to be driven will be 4,000 ft., and it will take 18 months to make necessary connections. The Old Town product (at present 100 tons per day) will be taken out through the tunnel. The company will also acquire and operate property between the line of the Newhouse tunnel and the Old Town mine, and will cut the Old Town several hundred feet below 1,500 ft., its present depth.

CLEAR CREEK COUNTY.

The International, Banner and Colorado Development & Investment companies have consolidated their holdings and will operate as the Banner Consolidated Mines Co., with H. A. Riedel, Idaho Springs, as manager. The entire property will be opened up through the Rockford tunnel, of Fall river, where a compressor plant will be installed, at a cost of about $7,000. Leasers are shipping from some of the consolidated properties.

Ramsdale.—This group of claims, situated near Georgetown, has been sold by local parties to Teagarden & Montgomery, representing Eastern purchasers; consideration being $35,000. A new plant of machinery is to be installed, and G. W. Teagarden, Georgetown, Col., is to be manager.

ROUTT COUNTY.

The Morgan anthracite coal land, situated between Deep creek and Hayden valley, containing about 800 acres, has been sold for a consideration of $80,000 to Dr. A. A. Johnson, who represents Eastern parties. The property adjoins the Crawford coal land, which recently changed hands.

SUMMIT COUNTY.

Carrie Group.—Wisconsin parties have leased and bonded this property for $20,000 and operations are to be started up at an early date. Breckenridge, Colo., parties are the owners.

CONNECTICUT.

LITCHFIELD COUNTY.

Connecticut White Lime Co.—This company has been incorporated by A. P. Freeman, John F. Duly and Albert M. Turner, with $225,000 capital. The company has secured a tract at North Canaan; it will quarry limestone and make lime.

GEORGIA.

LUMPKIN COUNTY.

Betz.—At this mine, near Auraria, Mr. Arnold, the lessee, has begun to sink a new shaft. He expects to go down 400 ft., or more.

Hand.—The lessees have reached the Knight vein in the new tunnel. As opened up, it is 10 ft. wide, 4 ft. thick and runs from $4 to $5 per ton. The ore is sluiced to the storage yard, and transported thence to the mill in tram cars.

IDAHO.

WASHINGTON COUNTY.

Idaho Placer Mining Co.—This company is building a bridge at its property at Old's Ferry on Snake river. Charles Green, general manager for the company, announces that all the machinery will be delivered in September and be installed immediately.

Iron Springs Consolidated Mining Co.—D. C. Nevin, president of this company, at Weiser, writes as follows: "Last week we held a stockholders' meeting, a number of representative men from the East being present. After spending four days examining the mines, they adopted resolutions approving the management. We have developed some rich mines included in the group owned by the company; among them is the White Rose, which has a large shoot of telluride ore. . . . A quantity of high grade ore has been mined and stored, ready for milling. This mine carries a good deal of sylvanite. Our 50-ton cyanide plant will be ready for operation by September; it is located on property carrying low-grade ores. It is our intention to install at least one more plant this fall, with a capacity of 100 tons per day."

INDIANA.

CLAY COUNTY.

H. H. Guire, member of the State legislature and associates, are engaging in coal mining near Howesville, seven miles southwest of Clay City, near the Green county line, where they have discovered a vein of 4½ ft. of fine block coal at a depth of 200 ft. The shafts that they are sinking are on the proposed link of the Monon railroad from Quincy to Linton.

KENTUCKY.

BOYD COUNTY.

Ashland Iron & Mining Co.—This company has completed a plant for the manufacture of slag cement, in connection with its furnace at Ashland. The works will have a capacity of 400 bbl. per day. The motive power will be electricity. The power plant consists of a cross compound engine of 1,000 h. p. direct-connected to a 400-kw. alternator supplying current at 480 volts. The cement machinery will be driven by 9 motors, 4 of which will be 75 h.p. each. The slag from which the cement is made will be dipped out of and immense basin, and delivered to the cement plant by a steam traction crane of 5-ton capacity.

MERCER COUNTY.

Chinn Mineral Co.—This company is at work on deposits of barytes near Har-

rodsburg, and expects to put in a plant to cost $20,000 for pulverizing the output. G. P. Chinn, J. P. Chinn, Phil. Chinn, George Morgan and C. D. Thompson, of Harrodsburg, and Professor Ellison, of Indiana, compose the company.

MICHIGAN.

HOUGHTON COUNTY—COPPER

Calumet & Hecla.—At the annual meeting of this company in Boston, Aug. 16, the stockholders adopted the following addition to the by-laws: "The directors at their discretion may, by such officers or agents as they may from time to time designate for the company, subscribe for, purchase and dispose of stock in any other company organized for the purpose of mining, refining, smelting, or manufacturing any or all kinds of ore, minerals or metals."

Another matter considered was that of increasing the board of officers by the addition of a second and also a third vice-president, creating these offices by amendment to the by-laws, and it was voted to do this. The following-named directors were elected: Alexander Agassiz, Newport, R. I.; Francis L. Higginson, Boston; Francis W. Hunnewell, Wellesley; Quincy A. Shaw, Jr., Boston; J. N. Wright, Detroit, Mich. The directors later held a meeting and elected these officers: President, Alexander Agassiz; first vice-president, Thomas L. Livermore; second vice-president, Quincy A. Shaw, Jr., third vice-president, Rodolphe L. Agassiz; secretary and treasurer, George A. Flagg, Boston.

The directors have declared a quarterly dividend of $10, the same amount as last paid.

Immediately after the close of the annual meeting of the Calumet & Hecla Co., like stockholders' meetings were held by the Manitou and Frontenac companies. Each of these companies elected a board of directors, which, with one exception, was identical with that elected for the Calumet & Hecla Co., as follows: Alexander Agassiz, Francis L. Higginson, Francis W. Hunnewell, Quincy A. Shaw, Jr., and James MacNaughton (instead of J. N. Wright). These directors then held meetings of the respective companies and elected these officers for both the Manitou and the Frontenac: President, Quincy A. Shaw, Jr.; vice-president, Rodolphe L. Agassiz; secretary and treasurer, George A. Flagg.

President Agassiz says of the company's plans: "In order to take advantage of the new mining laws passed by the Michigan Legislature last spring, we have branched out by purchasing about 60,000 acres of land in Keweenaw Point on which we propose to make extensive development and see what can be found in the exploration. There are a good many properties there which have been opened somewhat, and pits are known to exist in that section, which show a certain amount of copper.

"We propose, under the new Michigan laws, to develop these 60,000 acres we have acquired through the means of two new companies, one to be known as the Manitou Mining Co., and the other the Frontenac Mining Co., which are controlled by the Calumet & Hecla. Between these two companies we will divide our acreage and will soon begin exploratory work.

"In the Manitou company we control nine-tenths of the stock. The other tenth we had to give up as part of the purchase money to Charles A. Wright. We control every share of the Frontenac Mining Co., however. The purchase of this property was originally made for the timber at very moderate prices, but with the object in view of developing the properties for copper. The length of the copper-bearing lode upon our 60,000 acres is very considerable, and there is no reason why these amygdaloids should not be profitably worked.

"Formerly when these Keweenaw Point properties were worked the machinery in use was antiquated and with a lode carrying 1% copper and the metal at 17c., the companies could not make both ends meet because of the high costs of mining and milling and the old-fashioned methods of opening the mines. The 60,000 acres of Keweenaw property which have been purchased by the Calumet & Hecla have been entirely paid for. The Calumet & Hecla has no interest whatsoever in the Keweenaw Central Company."

IRON—MARQUETTE RANGE.

Lake Angeline.—The launder in what was formerly the bottom of Lake Angeline, at Ishpeming, built jointly by the Oliver Mining Co. and the Cleveland Cliffs Co. when the lake was pumped out some fifteen years ago, will be removed from the south to the north side of the basin. The launder was installed to take away the surface water accumulating in the former lake basin, the companies maintaining two pumping stations to prevent the water from soaking through the ground and finding its way to the underground workings. Cave-ins have frequently occurred, and portions of the launder have fallen away. A year ago the position of the launder was changed somewhat to avoid dangerous openings, and at present it runs over an orebody which will be attacked from the No. 3 shaft of the Hematite mine.

Mary Charlotte.—A large, three-track coal trestle has been completed at the mine at Negaunee, operated by the Breitung interests of Marquette. The trestle —20 ft. high and 400 ft. in length—has a capacity of 4,000 tons. It is located just north of the mine shaft. Further improvements will be made in the fall.

Saginaw.—This old mine at Ishpeming, sold at public auction in pursuance to a decree of the Circuit Court, was bid in by Henry W. Mildon, of Ishpeming, as trustee for the parties interested in the property, Mr. Mildon having foreclosed a mortgage which he and others held on the mine and adjoining lands, embracing three forties.

MINNESOTA.

Considerable exploration is under way near Grand Rapids, and some of it on the west side of the Mississippi river, on the trend of the Mesabi formation. The Oliver Iron Mining Co. and several Duluth men are credited with doing this work.

IRON—MESABI RANGE.

Hobart Iron Co.—This company has begun the opening of a mine upon its recently acquired tract in the northwest of section 25-58-17. About 3,000,000 tons of medium-grade ore exist there. A shaft will be sunk, and some machinery has arrived. It is the company's hope to get out ore the coming year. C. F. Babcock, of Cleveland, is in charge. The mine is owned by furnace interests in the Ohio district.

Consumers' Ore Co.—This company has begun shipment of ore from its new Alexandria mine, adjoining the Forest, in section 17-57-22. This is a small, open pit that has been stripped this summer by the Wallace Contracting Co., of Duluth. Its ore is similar to that of the Forest, high-grade bessemer, but is not in great quantity. The same company has closed its Frantz mine, at Buhl, and will not operate it this year, there being no need of its ores just now. The company is operating on a good scale in the Palmer district, of the Marquette range, where it has a lease of property belonging in fee to the Oliver Iron Mining Co. Its Yates mine, Mesabi, is shipping, and will make a good record for a first season.

Shenango Mining Co.—The sinking of a fourth shaft at this mine has begun. This will give two working shafts upon completion, probably during the coming year. The company intends to mine far more ore annually than before, and should take out about 400,000 tons a year, though its minimum is but 100,000 tons. There is a thick bed of very wet quicksand over the orebody here, and shaft-sinking is a costly and uncertain process. Three attempts were made before the first shaft was finally put into commission.

Winnifred Mining Co.—Laura mine, of this company, is shipping ore daily to the Zenith furnace at Duluth. The company's product this year will be small, as its Winnifred mine has been abandoned and Laura is making a small product.

Republic Iron & Steel Co.—This company's Pettit mine, which has been seriously troubled with water since its opening, has now installed a 2,000-gallon-per-minute pump of the Prescott triple-expansion type, and is taking care of its water with ease. About 1,500 gallons is the present product. This mine adjoins the new Hobart, which is now starting a

shaft. Pettit has a shovel working in its stockpile, and the daily shipment is better than 2,500 tons. If present expectations are carried out the mine will produce nearly 200,000 tons this year, which is far above its record. The same company's Bessemer shaft, at the village of Virginia, is producing 500 tons daily. Its Franklin and Union shafts are idle, and large stocks have accumulated at each. The Franklin is about worked out, unless some new exploration may develop more ore. The Union is owned jointly by this company and the United States Steel Corporation. Bessemer is laying out a large stocking ground for winter mining, and will be active during the coming winter.

NORTH CAROLINA.

BURKE COUNTY.

Blue Ridge Consolidated Mining Co.—This company has been organized with an authorized capital of $1,000,000. The incorporators are Charles Beebe and Charles W. Fisher, of New York, and L. Gordon, of Morganton. The company proposes to purchase and develop mining property. Headquarters are at Morganton.

OREGON.

BAKER COUNTY.

Highland.—The instalment of the new machinery at the Highland mine is progressing rapidly. The mill building is finished, with the exception of the sides, which have been left open in order to conveniently slide in the heavy machinery, which is now at the nearest railroad station, Haines, a few miles from the property. The mill is a roller-mill, and the reduction of the ore is on the principle of coarse concentration. Work is being rushed on the hydro-electric power plant; the timber for the flume is on the ground and is being prepared. The excavations have been made for the pipe-line and the electric transmission line is now being completed.

The ore in the face of the drift in the Glasgow tunnel, 400 ft. below the surface, still continues in quantity 9 ft. wide, on the average, with values a little over $10 to the ton. An upraise from the Glasgow tunnel is being made to the Bannockburn tunnel, but before starting the raise a crosscut was made to the foot wall, which opened up a body of ore, carrying values a little better than $12 a ton. It is expected to have the new plant in operation before snow flies. Manager Neil J. Sorensen is superintending the work.

Buckeye.—Manager H. N. Clark of this mine, which is 16 miles north of Baker City, and which is now in the hands of the re-organized company, reports that the mine has just been pumped out and that it looks to be in much better condition than was expected.

Imperial.—This mine in the Cable Cove district, 25 miles west of Baker City, is making a splendid showing this season and superintendent John Arthur reports that they have just uncovered a new orebody. They have been shipping ore all summer to the Sumpter smelter and are now making some improvements in the plant to increase the ore shipments. Most of the stock of the company is held in the East, principally by Detroit people.

Indiana.—Manager J. W. Messner, of the Indiana Mining Co., operating a copper mine, near Medical Springs, about 30 miles east of Baker City, is now engaged in installing the new machinery of that plant, assisted by District Manager Halloway, of the J. George Leyner Co., of Denver. The machinery is on the ground, and includes, besides the mill, a new hoist, air compressors, boilers, engine, etc. It is expected that later on hydro-electric power will be introduced. As soon as the mill is in operation the shipping of ore or concentrates will begin.

PENNSYLVANIA.

ANTHRACITE COAL.

Thomas Colliery Co.—Madeira, Hill & Co. have recently acquired the Kehley Run colliery of the Thomas Coal Co., and the new company will be known as the Thomas Colliery Co. The operation is near Shenandoah, on the lands of the Girard estate. The mine has been worked for some time, but there remains a large tonnage. The breaker capacity will be enlarged at once to 1,000 tons daily.

Lytle Coal Co.—This company, which is allied with the Susquehanna Coal Co., a subsidiary corporation of the Pennsylvania Railroad, has established a relief fund for its miners. The company will contribute and the employees will be assessed as follows: Those earning $2 a day and upward will pay $2.25 a month; from $1.50 to $2, $1.75 per month; from $1.50 to $1, $1.25 per month, and those receiving less than $1 a day will pay 75c. per month. Members will receive benefits according to their class rate, ranging from $6 to $2 a week, in case of accidental injury while at work. In the event of accidental death, $50 is to be paid for funeral expenses, and allowances of $3 to the widow and $1 for each minor child a week, for one year.

BITUMINOUS COAL.

A new road, known as the Cedar Creek railroad, is planned for the development of coalfields in Fayette and Westmoreland counties. This road is in the interest of the Pittsburg Coal Co., and will connect the Arnold mine of this company with the Youghiogheny river.

Kennerly Coal Co.—It is stated that this company and the Valley Stone & Coal Co. have sold their collieries to a Philadelphia syndicate. The price named is $1,600,000. The two companies have 3,800 acres of coal-land in Jesser and Conemaugh townships, near Johnstown. They also own right-of-way—on which some grading has been done—for a branch railroad to the mines.

Merchants' Coal Co.—It is reported that negotiations are in progress for the sale of this property by certain capitalists, among them Pittsburg parties. The Merchants' Coal Co., with main offices at Baltimore, Md., has about 14,000 acres of coal lands in Somerset county, Pa., and the present output is close to 2,000 tons daily, from the C seam.

Schoenberger Coal Co.—The stockholders of this company were to meet on Aug. 26 for the purpose of consolidating the Schoenberger Coal Co. with the Hazel Kirk Gas Coal Co., Penn-Manor Shaft Co., Pittsburg & Westmoreland Coal Co. and the Pittsburg & Connellsville Coke Co. The new company will be known as the Pittsburg & Westmoreland Coal Co., and will be capitalized for $3,000,000; a controlling interest will be held by H. A. and D. W. Kuhn. Most of the mines of this proposed company are in Westmoreland and Washington counties, and the output is expected to be about 2,000,000 tons a year.

TENNESSEE.

CUMBERLAND COUNTY

Mead's Gap Coal & Coke Co.—Reference was recently made in the JOURNAL to the purchase by this company of a tract of coal land to be worked. The tract includes 3,000 acres, situated near the Tennessee Central railroad. It was surveyed and examined by W. H. Crawford, mining engineer, of Nashville, Tenn. Mr. Crawford bought the land for some Nashville capitalists, and it was recently sold to parties in Birmingham, Ala., who will operate it. H. L. Badham, of Birmingham, is president of the company.

TEXAS.

HARDIN COUNTY.

Saratoga.—Rio Bravo Oil Co.'s No. 235 has been abandoned at 700 ft. Cole Oil Co.'s No. 1, after flowing for five weeks, is producing 200 bbl. under pump; five wells being drilled; daily output, 7,500 bbl.; stocks, 400,000 barrels.

Sour Lake.—The Texas Co. has had another fire, caused by lightning. Several tanks, containing 150,000 bbl. of crude, worth $40,000, were destroyed. Daily output, 7,500 bbl.; stocks, 1,000,000 barrels.

HARRIS COUNTY.

Humble.—The damage caused by the big fire is being rapidly repaired, and the large tanks are again being filled. The loss stated in last report is correct, and the increase in the price of crude has been very small; posted prices show an advance of 2c. Nearly every tank fire has originated in wooden-covered earthen tanks, and operators have concluded that their use is dangerous as well as expensive. It is probable that the Texas Co.'s tanks will not be re-covered, although such a cover in this warm climate undoubtedly prevents

a portion of the loss caused by evaporation. The field is showing a large falling off in production; some estimates are as high as 115,000 bbl. daily, but 90,000 is a more accurate estimate. There are now 45 wells being drilled.

JEFFERSON COUNTY.

Beaumont.—The only effect of the oil-tank fires has been an increase of 2c. in Humble crude. Other prices are unchanged. Stored oil in southern Texas and Louisiana amounts to over 20,000,000 bbl., after deducting the 2,650,000 bbl. destroyed; while the estimated daily production is 148,000, and consumption, 70,000. No increase in prices can be expected until there is a radical change in this state of affairs.

UTAH.

SALT LAKE COUNTY.

City Rocks.—This property, at Alta, is about to be bonded for a consideration of $100,000. An eastern syndicate is after the property.

Consolidated Jefferson.—A ledge, showing considerable native copper, has been opened in this property.

Butler Liberal.—This property, at Bingham, is being actively developed. An adit is being run for a copper ledge. No effort is being made to ship ore.

South Columbus.—The tunnel at this property has been completed for about 1,200 ft. Work is being done by contract.

SUMMIT COUNTY.

Silver King Consolidated.—Sinking has been resumed at this property, after the installation of pumps large enough to take care of the water.

Ontario Tunnel.—The task of removing the obstructions which have had this avenue closed since March 1 is progressing satisfactorily.

TOOELE COUNTY.

Honerine Tunnel.—From a station 8,400 ft. in, a drift toward the Galena King mine has been commenced. Connection is to be made with the workings of the latter, when ore shipments from there will be begun. To reach the Galena King side-line, it will be necessary to drive about 700 feet.

WASHINGTON.

FERRY COUNTY.

Ben Hur.—Stoping continues on the 115 and 230 ft. levels. On the former the north drift on the vein is being driven to connect with a tunnel driven several years ago to a point about 400 ft. distant from the shaft. In addition to two Sullivan drills, three Leyner drills have been put in commission. The ore shipments will be increased and the shaft sunk to a deeper level.

Belcher.—Five men are employed on two shifts, cross-cutting for a parallel vein east of the main vein.

Copper Key.—The lower tunnel is in over 500 ft. and still in limestone. Small stringers of ore, lying rather flat, have been crossed.

Oversight.—The crosscut from the west side tunnel has developed a fine prospect. One shift is employed driving the tunnel along the footwall of the vein.

Belcher Mountain Railway.—Between three and four miles of roadbed, from near the Hawkeye mine westward, is nearly finished, and a part of it already surfaced, with ties distributed and ready to lay. The bridge and trestle timbers are on the ground and partly framed. The controversies in regard to right of way have been settled.

OKANOGAN COUNTY.

Palmer Mountain Tunnel & Power Co.—This company has succeeded the Palmer Mountain Gold Mining Co. The executive officers are John Tilley, of Holyoke, Mass., president; F. G. Burnham, vice-president; E. E. Burr, of Springfield, Mass., second vice-president; Samuel Porter, of Florence, Mass,, treasurer; Leo H. Porter, of Northampton, Mass., secretary; John Boyd, resident at the mine, general manager. They, with F. E. Goodhall, of Spokane, Wash., comprise the board of directors, and all of them are large shareholders. The company is out of debt, and has ample capital for equipment and development of its property. Water and electric power, especially designed, is under construction and consists of a 750 h. p. Eisher-Weiss turbine wheel, made by the Allis-Chalmers Co., at Scranton, Pa., to be operated on Touts Coule creek, under a 365 ft. head; a 750 h. p. Bullock alternating current, electric generator, under construction at Cincinnati, O.; a ¼-in. steel penstock, 27 in. diameter and nearly 800 ft. long. Electric drills for the mine and a 300-ton mill will follow. Tests of ore show 40% of the ore values can be saved by plate amalgamation, and a recovery of 95% from the tailing, by straight cyaniding, is expected. It is hoped to have the drills running in 60 days after delivery. A wooden flume, 4 by 5 ft. inside measurement and a mile in length, is to be constructed. The walls of the power-houses are to be of stone. An electrical transmission line will be built from the power plant to the mill, and the latter will be situated about 1,500-ft. from the portal of the tunnel. The flume bed is completed. Men are now blasting rock and constructing a grade for a tramway from the tunnel to the mill site. The ore will be drawn in cars through the tunnel by an electric motor and delivered at the top level of the mill. The construction of the power-house on the creek has been started. The electrical construction will be directed under the supervision of C. S. Reitze, an electrician of wide experience.

Pinnacle.—The title to the mine has been quieted and work will be resumed immediately.

WEST VIRGINIA.

MONONGALIA COUNTY.

Andrew Brown, Philip R. Linn, F. W. Forsythe and others, of Fayette county, Pennsylvania, have completed the purchase of 6,000 acres of coal land, which they will develop, near Cross Roads. W. T. Barr, of Amos, W. Va., made the sale at about $210,000, or $35 per acre.

WYOMING.

CONVERSE COUNTY.

North Platte Copper Mining & Smelting Co.—A receiver has been appointed for this company at suit of several stockholders, resident in Boston. W. N. Poland, of Boston, is the receiver.

Foreign Mining News.

AFRICA.

TRANSVAAL.

Corrected returns for July give the gold production for the month as follows: Witwatersrand, 407,121; outside districts, 18,384; total, 419,505 oz. fine gold. This is 7,188 oz. more than in June, and 111,-665 oz. more than in July, 1904. For the seven months ending July 31 the total was 2,123,053 oz. fine gold in 1904, and 2,780,-275 oz. in 1905; an increase of 657,222 oz. this year. The supply of native labor underwent some reduction during the month, the Native Labor Association reporting that against 6,023 natives distributed to the mines, 8,338 left through expiry of contracts and other causes, leaving a net loss of 2,315. On the other hand, a telegram from Johannesburg in reference to Chinese labor states that the number of Chinese employed on the Rand on July 8 was 41,299. Snce that date 1,913 coolies arrived, 59 died during July and 12 were repatriated. The total in the country on July 31 was 43,141. A steamer is on the way from China with 1,827 laborers.

ASIA.

INDIA—MYSORE.

Kolar Goldfield.—The reported gold output for July was 52,191 oz. bullion, a decrease of 546 oz. from June. For the seven months ending July 31 the total was 365,511 oz. bullion, an income of 7,598 oz., as compared with the corresponding period in 1904. The bullion reported this year was equal to 328,960 oz. fine gold, or $6,799,603 in value.

AUSTRALIA.

QUEENSLAND.

The yearly Mines Report of this State, just issued, says: "In 1904 the production of coal reached 512,015 tons, valued at £166,536, an increase in quantity of 4,214 tons, and in value of £1,538. The number of men employed was 1,336. The principal coalfield in the State is in the Ipswich district, and it is from the Ipswich mines

that the increased production has been derived, some new pits having been opened, and the output of some of the larger collieries having been enlarged. Unfortunately, the increased production has not been accompanied by a corresponding expansion of trade, and during last year few of the mines have, on an average, worked more than three or four days per week."

The Mines Department reports the production of gold in June at 54,859 oz., fine, of which 1,569 oz. came from alluvial workings, 1,269 oz. from re-treatment of old tailings and the balance from quartz mines. For the six months ending June 30 the total output in fine gold, was 310,201 oz. in 1904, and 290,478 oz. in 1905; a decrease of 19,723 oz. this year. Dividends reported by Queensland mines for the six months of this year were £329,912 in all.

TASMANIA.

The value of the mineral output for the first half of 1905 is given by the Mines Department as follows: Gold, £151,427; silver-lead, £105,299; copper and copper ore, £336,337; tin ore, £132,039; iron ore, £1,450; coal, £21,194; flux, £933; wolfram, or tungsten ore, £1,627; bismuth, £15; total, £749,688. The chief increase shown was in tin ore.

WESTERN AUSTRALIA.

The gold output in July was 166,001 oz. fine. For the seven months ending July 31 the total was 1,131,375 oz. fine gold. This shows a decrease of 14,085 oz., as compared with last year.

CANADA.

The Dominion government has passed an order in Council barring steel rails from the benefits of the act of 1903 authorizing a bounty on steel structural forms. It was not by the acknowledged design of the government that steel rails came to participate in the distributions under that act. Apparently the extension of the bounty to rails was due solely to inadvertence, or to indistinctness of language. The statute provided for bounties on rolled iron and steel. When the Algoma Steel Co. put its rails on the market it applied for a bounty of $3 per ton upon them, contending that they were "rolled shapes, not round, oval, square or flat, weighing not less than 35 lb. per lineal yard." This claim was disputed by the government, but supported by its legal advisers. The bounty is now, however, withdrawn by the new order.

BRITISH COLUMBIA.

The Department of Mines of the Canadian Government is to undertake an investigation of the zinc resources of British Columbia, with a view to determining their magnitude, future prospects and the direction in which exploitation should be pursued. This work is to be under the general direction of Walter Renton Ingalls, of New York, but the field work of examining mines, etc., will be conducted by Philip Argall, of Denver, Colo., assisted by Alfred C. Gardé, of Nelson, British Columbia.

BRITISH COLUMBIA VANCOUVER ISLAND.

Tyee Copper Co.—This company reports that during the month of July its smelter ran 11 days and smelted 1,793 tons of Tyee ore, giving a return of $31,472, after deduction of freight and refining charges.

NOVA SCOTIA.

Canada Coal & Railroad Co.—This company has been organized to take over the property of the old Canada Coal & Railway Co. at the Joggins. The capital is $300,000 preferred and $300,000 common stock.

River Hebert.—In this new coal district, in Cumberland county, much work is being done, according to the *Industrial Advocate*, of Halifax. Within a few miles of one another are the Minudie mines, now locally known as Kimberly; Strathcona mine, just across the river, half a mile from the first mentioned, and 4 miles on toward Maccan is the Jubilee mine. The sales from the Minudie last year were 35,000 tons; Strathcona, 6,000; Jubilee also sold a considerable tonnage. The Minudie mine has hitherto shipped its output by way of the Joggins railway. It is proposed to find another outlet by way of a new railway from the mine to the mouth of the river, a distance of 6 miles. Construction has already commenced on this road. Federal and provincial subsidies are available and a pier will be built at the terminus.

EUROPE.

BELGIUM.

The production of pig iron in Belgium for the six months ending June 30 was as follows, in metric tons :

	1904.	1905.	Changes.
Foundry iron	52,470	50 858	D. 1,612
Forge iron	120,787	102,233	D. 18,554
Steel pig	476,450	517,187	I. 40,737
Total	649,707	670,278	I. 20,571

Steel pig includes bessemer and basic iron. On June 30 there were 35 blast-furnaces active, as compared with 34 on January 1. The average output per furnace was 19,428 tons for the half-year.

MADAGASCAR.

Several English parties, chiefly sent out by persons interested in Transvaal mines, have been prospecting for gold in Madagascar. Recently it was reported that this work had been stopped, by orders from the French Government. Concerning this, the Ministry of Colonies at Paris has made public the following explanation: "After the discovery of rich veins of gold in Madagascar, the Governor issued a decree on June 3 last suspending the delivery of permits to prospect the regions in which it was presumed that gold was to be found. The decree did not interfere with the concessions already granted. A subsequent decree, under date of June 25, only explains the former one, and was issued in the interest of prospectors to safeguard their rights of priority in prevision of the future delivery of permits to prospect when the question of a new mining law for Madagascar was settled. Such a measure of prudence could not give rise to objections. With regard to the future export duty on gold, no one could blame the Government for raising it. The tax is now only 5%, an absurdly low charge, considering the royalty on the production of gold in other countries. The fact must be borne in mind that the soil in Madagascar is a State domain and not private property. The Government has, consequently, a legitimate right to take a reasonable share of the mineral wealth of a territory that belongs to it. The export duty on gold will, therefore, be raised to 20 or, perhaps, 25%—the amount is still under consideration. The rights of concessionaires, French or foreign, remain entire with regard to the prospecting of ground already belonging to them."

MEXICO.

CHIHUAHUA.

The Calera Mining Co. is shipping zinc ore from its mines, 12 miles from Miñaca, Chihuahua, to Pueblo, Colo. The company recently completed a narrow gauge railway to the mine.

SONORA.

Greene Consolidated Copper Co.—A circular has been issued by this company, the substance of which is given below; it is dated Aug. 16, from the New York office:

The production of copper from the mines of the company at Cananea, Mexico, for the months of June and July was 10,429,778 lb., containing 7,264 oz. of silver and 70 oz. of gold. During the month of June the company sold 6,828,200 lb. of copper at an average price of 15.054c., and for the month of July 12,024,000 lb. at 15.077c., disposing of practically all copper on hand. No copper has been sold ahead of production. For the fiscal year ending July 31, 1905, the company produced 63,005,848 lb. of refined copper, 39,927 oz. of silver and 3,790 oz. of gold, as against 55,014,339 lb. for the fiscal year ending July 31, 1904; 42,310,554 lb. for 1903; 38,268,407 lb. for 1902; and 28,826,000 lb. for 1901. Under the present price of copper, the management has directed its efforts to working as low a grade of copper as is consistent with realizing the net amount of money required for dividend purposes, the average grade of ore treated at present being 4½% copper as against approximately 6½% copper during the preceding year. The improved facilities for extracting and reducing ores enable the company to handle lower grade ore at a good profit.

A large amount of development work is being done and the ore reserves are being increased from month to month. A large

amount of money has also been expended in laying new tracks, opening chutes, and in mine equipment, which is charged to current extraction of ore. The developments on the lower levels have been satisfactory. On Level 6 of the Capote, the orebody lying to the north of the original Capote orebody is opening up very satisfactorily and ore extraction is now commencing therefrom, the two drifts already run showing an orebody 80 ft. in width, now open to 400 ft. in length and averaging 5% in grade of a very good class of concentrating ore. On the seventh level, drift running south under the original Capote orebody is giving good returns. Drift 124, after being extended east to connect with the drill hole sunk on the Esperanza zone, was continued east, and on Aug. 4 had cut 40 ft. of good grade of ore. As this orebody is in entirely virgin ground, and in direction of the orebody formerly worked on the old Chivatera, it has great possibilities. North of the Chivatera gulch, upon the Mina Grande, shaft is down over 200 ft., showing a body of low-grade ledge matter. This ground lies immediately east of the Indiana-Sonora ground. Crosscut No. 7 on the Veta Grande, which has been run in from the Democrata gulch, is now in 1,200 ft. and drifts are being run from this crosscut to connect with the Veta Grande and Massey orebodies 2,600 ft. distant to the north. In the drift running to the Veta Grande, 300 ft. of good grade concentrating ore have been passed through.

Crosscut penetrating the Puertecito hill, which will drain the entire mountain, is also being run, about 100 tons per day of carbonate and oxide ores being extracted from the Puertecito end, which, pending the completion of the reverberatory furnaces, is of value as flux. The extension of the broad gauge railroad south of the store to the machine shop and ore-bedding plant, is completed. Material for the sampling mill, belt conveyors, structural iron, etc., for the ore-bedding plant, is under way. The ore-bedding plant, when completed, will have a capacity for 30,000 tons of ore and should materially reduce smelting costs. The re-building of Section A of the concentrator is well advanced.

SOUTH AMERICA.

ECUADOR.

Raymond Payne, of London, who recently spent some time in the province of Esmeraldas, Ecuador, went there to examine the placer districts of that locality and, if found satisfactory, to make estimates for the installation, in the near future, of several dredges. Mr. Payne reports that his examinations show that these properties carry gold and platinum, and the conditions for dredging are favorable. He has made estimates for eight dredges to be installed there, and is now engaged in making the design for them. Mr. Payne is of the firm of F. W. Payne & Brother, of Dunedin, New Zealand, and London, whose dredges are well known.

Coal Trade Review.

Aug. 23.

ANTHRACITE.

The hard coal market as yet shows no decided improvement. In view of the approaching rise to normal winter prices, line trade is showing some briskness, but deliveries at tidewater show none. Most of the mines have been operating fairly continuously, and the fact that overproduction is not greatly feared is shown by the expected opening of the Lackawanna's Truesdale breaker at Nanticoke. Some mines close down at intervals, as best suits their convenience. It is expected that tidewater business will soon be stimulated by the apprehension of a car shortage, the indications of which are already apparent. Small sizes of buckwheat are in demand in some quarters, while in others a large stock is reported.

Wholesale prices remain at $4.65 for broken and $4.90 for domestic sizes, f. o. b. harbor shipping points. Steam sizes are in good supply at the same prices as last week: $3 for pea; $2.25@$2.50 for buckwheat; $1.45@$1.50 for rice, and $1.30@$1.35 for barley.

BITUMINOUS.

The soft-coal trade along the Atlantic seaboard shows a continuance of the improvement noted last week. Its effect is more marked in the Southern trade, but all classes are thought to have passed the point of extreme depression; the lowest prices are no longer quoted. It is still too early to look for the boom of fall conditions, and it is an encouraging circumstance that any improvement whatever has yet occurred. Reports of shortage in car supply reach us, and with the railroads occupied in moving the tremendous crops of the West, still more difficulty in soft-coal movement may be anticipated. This is due rather to the diversion of traffic power to the agricultural districts than to any invasion of coal territory by western products. Vessel tonnage is below requirements at most ports, so that some consumers, who are pressing for shipment, do not obtain the tonnage that they need; this, however, is thought to be a temporary condition.

Trade in the far East is taking on a considerable quantity, especially from the most southern parts. Shippers who have been fully contracted seem to be busy, while those who have relied upon transient business are not active. Trade along the Sound shows a variable condition, with orders coming in irregularly; at one time coal will be hurried to tide for use in this territory, and soon after shipments will be largely suspended. On the whole, a fair tonnage is going forward.

New York harbor trade is quiet. No congestion is noticed at any harbor shipping points, and practically no coal remains to be forced upon the market. The lowest grades sell at $2.20@$2.25, with better steam coal obtaining 15 and 20c. above this. All-rail trade continues strong and active, any slight diminution in volume at one point being compensated by increases in others. Car supply has not been over-abundant, although those who take prompt care of their arrivals at tidewater usually can obtain their full needs if they are insistent. Transportation has been slow.

Coastwise vessel trade shows that boats have been in short supply, although at this writing they are arriving in sufficient numbers to care for urgent requirements. Philadelphia quotes as follows: To Boston, Salem and Portland, 65@70c.; to Lynn, 80@85c.; to the Sound, 55c.; to Newburyport and Camden, 80c.; to Portsmouth, 70c.; to Bath and Bangor, 75c.; to Saco and Gardner, 90@95c. and towages. New York harbor charges, 50@55c. to around the capes.

COAL TRAFFIC NOTES.

The coal and coke tonnage originating on the Pennsylvania Railroad lines east of Pittsburg and Erie for the year up to Aug. 12 is reported as below, in short tons:

	1904.	1905.	Changes.
Anthracite.....	2,743 657	2 837,839	I. 94,182
Bituminous....	16,387,189	17,324 725	I. 937,536
Coke..... ..	5,132,464	6,690,161	I. 1,557,697
Total.....	24,263,310	26,852,725	I. 2,589,315

The total gain this year was 10.7%, the more important increase being in coke.

Shipments of anthracite coal for the seven months ending July 31 are reported as follows, in long tons:

	1904. Tons.	Per Ct.	1905. Tons.	Per Ct.
Reading.....	6,587,919	19.5	7,101,510	20.1
Lehigh Valley.	5,569,529	16.4	5,799,126	16.5
N. J. Central.....	4,285,114	12.6	4,503,415	12.8
Lackawanna.....	5.465,654	16.1	5.424 548	15.4
Del. & Hudson.....	3,320,673	9.8	3,415,934	9.7
Pennsylvania.....	2,779.086	8.2	2.859,952	8.1
Erie.....	3,469,861	10.2	3,573,195	10.1
N. Y., Ont. & W.....	1,544,640	4.6	1,665,548	4.7
Del., Sus. & Schuyl..	857,940	2.6	920,512	2.6
Total.....	33,880,434	100.0	35,263,740	100.0

The total increase this year was 1,383,306 tons, or 4.1%. Every company showed an increase, except the Delaware, Lackawanna & Western, which reports a small decrease. The total July shipments were 4,516,743 tons, being 106,484 tons less than in July of last year.

Birmingham. Aug. 19.

Very little change is noted in coal conditions in Alabama. The mines operated by the furnace companies, where union miners are out on strike, do not show much improvement as to output, if any, though there are more men being brought into the district.

The East Pratt Coal Co. has been incorporated, capital stock, $20,000, by John T. Morgan, Kendred McConnell and A. Aouff. The new company has already begun to open a mine in this district.

A vein of fine coal has been discovered

within a short distance of Jasper, in Walker county, and steps are being taken for its development.

The Pratt Consolidated Coal Co., now opening new mines in Walker county, expects to be able to ship coal from the new openings by the time the railroad extension has been constructed.

Coke is in strong demand. The production is not meeting the demand and considerable coke is still being brought into the State from West Virginia.

Chicago. Aug. 21.

The wholesale coal market is still in the "deadly dull" stage that has existed practically all summer. There are signs of activity, but they are slight, and may be no more than temporary. The conditions surrounding the trade are not such as to warrant prophecies of general prosperity for dealers in Western bituminous. Agents for Eastern coals are doing better, but the Chicago market is essentially a market for coal from the Indiana and Illinois fields, and such coal is being sent here in greater supply than the demand warrants.

Dealers in anthracite also find competition increasing; not since the establishment of the system of graded prices, it is said, has there been so much private coal on the market, with resulting price-cutting. Some sales, it is asserted, are made at 30c. to 40c. under the established price for August. The large amount of coal accumulating on tracks forces many of these sales.

Smokeless and Hocking are fairly steady, of Eastern coals; the demand for Hocking is better, and prices are steadier, hovering about $2.90 for the higher grades. Dealers in smokeless assert that the coal is very firm and that the demand is increasing steadily. Illinois and Indiana coal brings $1.75@$2.20 for lump, $1.40@$1.70 for run-of-mine, and $1@$1.50 for screenings.

The trade is hopeful of September, and the signs are encouraging for an increase of trade in that month, both in bituminous and anthracite.

Cleveland. Aug. 22.

The movement of coal up the lakes has started a little more freely, with the opening of the fall. The demand for tonnage comes as a welcome relief to the vessel-owners, who have been struggling all summer to keep their boats employed without delays. The rates of carriage have not advanced with the better demand, but have held steady at 30c. to the head of the lakes and 40c. to Lake Michigan points. The contemplated advance in the price of Lake three-quarter coal has not taken place, but the market is rather easy, with prices just about holding steady. The material is quoted at $1.90 f. o. b. Lake Erie docks.

The demand for steam coal is on an even keel; the same old struggle to keep the production down to the point where it will not flood the market with material. The prices are stable under the circumstances, being 90@95c. at the mines for run-of-mine.

The coke market is a little stronger, but the material seems to be plentiful. Prices hold at $2.35@$2.50 at the ovens for the best grades of 72-hour coke, while furnace coke is selling at $2 at the oven.

Pittsburg. Aug. 22,

Coal.—Prices are not very firm, and while run-of-mine is quoted at $1@$1.05 at the mine it is believed a lower rate could be obtained on a good order. Slack is firmer and is now held at 60c. About 1,000,000 bushels of coal were sent to Cincinnati on a small rise in the rivers Saturday, and there is now a large supply at that port, as shipments to New Orleans have been stopped for the present on account of the yellow fever epidemic.

Connellsville Coke.—Prices remain at $2@$2.20 for furnace and $2.60@$2.80 for foundry. The production for the week amounted to 250,508 tons, a decrease of 1,487 ton from the previous week. The shipments aggregated 10,969 cars, distributed as follows: To Pittsburg and river points, 4,173 cars; to points west of Pittsburg, 5,575 cars; to points east of Everson, 1,221 cars. This was an increase of 214 cars.

San Francisco. Aug. 17.

There is no change in the coal market, and supplies are sufficient for the demand. The shortage in some descriptions of coal does not seem to be felt, and prices show no variation.

For Coast coals, in large lots to dealers, prices are as follows: Wellington, New Wellington and Richmond, $8; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; White Ash, $5.25. For Rocky Mountain coals, in car lots, quotations are: Colorado anthracite, $14; Castle Gate, Clear Creek, Rock Springs and Sunny Side, $8.50. Eastern coals are nominal at $14 for Pennsylvania anthracite, and $13 for Cumberland. For foreign coal quotations are, ex-ship: Welsh anthracite, $13; cannel, $8.50; Wallsend and Brymbo, $7.50 per ton.

Foreign Coal Trade.

Aug. 23.

Exports of fuel from Great Britain for the seven months ending July 31 were as follows, in long tons:

	1904.	1905.	Changes.
Coal	20,515,244	27,025,633	I. 409,989
Coke	390,240	381,214	D. 9,026
Briquettes	772,383	657,747	D. 114,636
Total	27,778,267	28,064,594	I. 285,327

In addition to these exports the coal sent abroad for the use of steamships engaged in foreign trade was 9,784,104 tons in 1904, and 9,995,256 tons in 1905; an increase of 211,152 tons. The total fuel sent abroad and consumed outside of the United Kingdom in the seven months of this year was 38,059,850 tons, or approximately 27.5% of the production.

The exports to the United States, included above, were as follows for the seven months:

	1904.	1905.	Changes.
Atlantic Ports	$25,595	25.741	I. 146
Pacific Ports	71,293	72.415	I. 1,122
Total	96,888	98.156	I. 1,268

The changes were very small. The more important exports were: To Germany, 4,413,319; Italy, 3,895,496; France, 3,733,848; Sweden, 1,598,512; Spain, 1,360,478; Egypt, 1,270,049; Denmark, 1,263,403; Holland, 1,227,536; Russia, 1,211,436 tons. No other country took as much as a million tons.

Iron Trade Review.

New York, Aug. 23.

Buying reports continue to improve, and it looks as if the fall business was beginning to come in ahead of time. In pig iron there is a steady run of orders for foundry, and a special demand for basic pig. It is reported that the Steel Corporation will be on the market in September for a considerable quantity of bessemer pig from outside furnaces.

In finished materials, the strong demand is for structural material and plates—the former for bridge and general construction work, the latter for car- and shipbuilding. The Lake shipyards have a number of contracts, and some work is reported in seaboard yards also.

On its bid of $7,284,000 the contract for building the superstructure of the Manhattan Bridge, between New York and Brooklyn, has been awarded to the Pennsylvania Steel Co. The company was the lowest of five bidders. The bridge contract calls for the manufacture of 43,000 tons of steel, 8,000 tons of which will cover the wire cables and fittings. On the following day, however, the Supreme Court granted a temporary injunction upon the application of Smith, Conway & Weed, restraining Bridge Commissioner George E. Best from making or executing any contract with the Pennsylvania Steel Co. for this work. Peter F. Gage brings the action. The matter is likely to be in the courts for some time.

Birmingham. Aug. 21.

The past week witnessed considerable activity in spot business. The manufacturers received quite a number of orders, though in small lots, for iron; in almost every instance the business was accepted, there being iron ready for delivery. One or two companies in this district have withdrawn from the market altogether, so far as No. 1 and No. 2 soft and No. 2 foundry irons go, their sales now being larger than they desire with the time of delivery attached thereto. In one instance

it is stated that the company will be out of the market for two months on No. 2 foundry. The aggregate on the spot delivery orders of the past week was very good. The quotations in this district are firm. The furnaces are now pretty well sold ahead until October at least.

The production is holding up well. It is now stated definitely that the Tennessee Coal, Iron & Railroad Co. will within the next two weeks blow in two furnaces at Bessemer and one furnace at Oxmoor. The Sloss-Sheffield Steel & Iron Co. report good results from the furnace recently started up at North Birmingham.

The following quotations are given: No. 1 foundry, $12.50; No. 2 foundry, $12; No. 3 foundry, $11.50; No. 4 foundry, $11; gray forge, $10.50@$11; No. 1 soft, $12.50; No. 2 soft, $12.

No change has taken place in steel in this district. The Tennessee Coal, Iron & Railroad Co. has sold more than 125,000 tons of steel rails, delivery next year, and orders have been offered which practically assure operation at the plant through the next 15 months.

The North Birmingham Forge Co. expects to put its plant in operation in September. Two buildings have been completed and heavy machinery placed.

Cleveland. Aug. 22.

Iron Ore.—The market during the past week has been active. The docks are congested with ore and direct shipment is necessary. Railroad equipment has been sufficient to take care of the needs, and consequently no easing of the speed of shipment down the lakes is necessary. The rates are steady at 75c. from Duluth, with other rates proportionately lower. Prices hold steady at $3.75 for bessemer Old Range; $3.50 for bessemer Mesabi; $3.25 for non-bessemer Old Range, and $3 for non-bessemer Mesabi.

Pig Iron.—Foundry buying is light; most of the material sold during the week at $14.25 in the Valley for No. 2. Most of the furnaces are now so well filled with orders that they are asking $14.50. No big tonnage is being booked. The bessemer, basic and malleable trades are in the same position, the price situation being identical. The hopes of the furnaces are that the Steel Corporation will buy material during September, of which there are rumors. Southern foundry is offered in this territory at $11.50@$11.75 Birmingham.

Finished Material.—It is now found that recent orders for structural covered the needs of the shipbuilders for material enough to build 10 new ships. Of these, three have been ordered, and contracts will be closed probably inside the week for seven more. Building contractors are hindered by the shortage, many of them being compelled to buy their material at a premium of $5 to $6 a ton. Standard rails are selling at a premium of $1 to $3 a ton, due to the shortage. The news that buying orders for 50,000 tons of billets are in the market caused the advance in the price of that material to $26 a ton Pittsburg. Forging billets are correspondingly higher. Most of the big orders for steel bars are in, but small buyers are still taking lots from 500 to 1,000 tons. Sheets are sold at a reduction for quick shipment, although no contracts are being placed on the low basis. Bar iron is strong at 1.60c. at the mill.

New York. Aug. 23.

Pig Iron.—A good deal of business has been done, chiefly in lots of moderate size. Prices are firm, and there are no concessions on standard makes. For near delivery the range is a little higher.

For Northern iron, in large lots, the quotations are: No. 1X foundry, $16.50@$16.75; No. 2X, $16@$16.50; No. 2 plain, $15.50@$15.75; gray forge, $14.50@$14.75. Northern basic sells for $15@$15.25; Virginia basic, $15.75. Virginia foundry is $16.90 for No. 1, and $16.25 for No. 2. For Southern iron on dock we quote: No. 1 foundry, $16.25@$16.50; No. 2, $15.75@$16; No. 3, $15.25@$15.50; No. 4, $14.75@$15; No. 1 soft, $16.25@$16.75; No. 2 soft, $15.75@$16; gray forge, $14@$14.50. No. 1 soft is scarce.

Warrants are dull. Latest quotations, September and October, are $14.85 bid, $15.50 asked, regular warrants; $15 bid, $15.60 asked, for foundry warrants.

Cast Iron Pipe.—Orders are still coming in, and the makers are all full of work. Current quotations for carload lots are on a basis of $27 per net ton, 6-in. pipe, at tidewater.

Bars.—Bar iron is selling well. Quotations are firm at 1.645c., large lots on dock. Steel bars are 1.645c. Store trade is fair, with quotations 1.75@2c. delivered.

Structural Material.—Business continues good in small orders coming to jobbers. Premiums are still being asked for early deliveries. Beams under 15-in. are 1.745c. for large lots; over 15-in., 1.845c.; angles and channels, 1.745c., tidewater delivery. Large orders are not closed here, as a rule, but directly with mills.

Plates.—Plates are in steady demand in small lots. Tank plates are 1.745@1.795c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.645c. up, according to width.

Steel Rails.—No change in standard sections. Light rails are quiet, prices ranging from $20.50 for 35-lb., up to $24.50 for 12-lb. rails.

Old Material.—The market is active, and prices are strong, but without much change. No. 1 railroad wrought brings around $16.50@$17.50; No. 1 yard wrought, $14.50@$15; machinery cast, $13.50@$14. There is demand for heavy steel melting scrap, and sales are made at $14.50@$15. These prices are on cars, Jersey City, or other terminal delivery.

Pittsburg. Aug. 22.

A decided improvement is noted in the iron and steel markets this week, and it now seems probable that the fall buying movement will begin earlier than had been anticipated. The feature of the week was the placing of a number of large contracts for plates for delivery next year by ship-building concerns. All of the business was booked at the pool price of 1.60c., which is practically $4 a ton more than the price at which the bulk of this year's business was accepted. While the pool last December fixed the price of plates at 1.60c., most of the contracts running through the year were taken at 1.40c. The plate mills have been in continuous operation all year, and all new business during the past few weeks has been at premiums. A number of mills are entirely out of the market for 1905, and there is now no doubt that the established price will be maintained, and it may go higher. Besides the large orders from ship-building interests, it is likely that many more steel car orders will be placed shortly, which will still further strengthen the outlook for plates. But little new business in structural material is being booked, as the building season is too far advanced. The structural mills are all busy, and it would be almost impossible for some of them to take on any new contracts for delivery this year. A few small mills in the East, that are able to take care of new orders, are said to be asking substantial premiums for delivery this year. The demand for wire products continues to improve, and a good trade is expected in the fourth quarter. Prices are likely to be advanced, but this may not be done until the large buyers have placed their contracts at the ruling prices. The steel bar market is very firm, and many of the mills are from four to six weeks behind on specifications. There is still some contracting for extended future delivery, but the bulk of the business was placed several weeks ago. The price established by the pool is being strictly maintained, and, as in other lines where prompt delivery is desired, premiums are being paid. In iron bars the market is in excellent shape, the minimum price being 1.60c Pittsburg, which is $1 a ton higher than the price that ruled about three weeks ago, and there is no likelihood of shading this year. About the only weak line is merchant pipe, prices having declined to the low point reached last fall. On ordinary car-load lots to consumers, 79% off the list for black and 69% for galvanized are quoted. This is four points below the established list, which has been nominal since the first of the year. If some large projects are carried out, the pipe market will be considerably strengthened. There are good

indications of a big improvement in the tin-plate trade. The American Sheet & Tin Plate Co. has just notified the Amalgamated Association of Iron, Steel & Tin Workers that business necessities requires the fulfillment of the agreement providing for the deduction of 3% of the workers' earnings for the re-export trade. The deduction last year was 1½%, but under the new wage settlement the increase was agreed to, as the company announced that it could capture more of the rebate trade if the concession was made. The collections for the rebate fund will be taken from the next pay. While no official information is given by the company on its contracts, it is understood that some large orders are being placed by the packing interests and the Standard Oil Co. There are still some idle tin-plate mills, but it is believed all will be in full operation about the first of the month.

Pig Iron.—Prices of bessemer have advanced, and $14.50, Valley furnace, is now recognized as the minimum. One sale of 1,000 tons was made yesterday at that price, and the sales for the week aggregate about 5,000 tons. One lot of 2,000 tons sold last week at $14.40, Valley furnace, and several smaller lots brought 10c. a ton more. A large number of inquiries have been received during the past few days, and it is said that some interests have declined to sell at $14.50, and are holding out for a higher price. It is expected that the United States Steel Corporation will come into the market for from 30,000 to 40,000 tons for September delivery, but there is no official information on the subject. Basic iron is held at $14.25@$14.50, Valley furnace, but no sales of any consequence are noted. Foundry iron is firmer, No. 2 being quoted at $15.10@$15.35, Pittsburg. Gray forge is higher, and is quoted at $14.75@$15, Pittsburg, and it is believed the latter figure will be the minimum price in a short time.

Steel.—The billet market continues firm, although there have not been any large transactions lately. Bessemer billets are quoted at $24, and open-hearth billets at $25; sheet-bars are firm at $25.50, all f. o. b. Pittsburg. Plates remain at 1.60c., and merchant bars at 1.50c.

Sheets.—A number of inquiries have been received, and some new business is being placed. Prices are not firm, and it is possible to do 2.30c. on black and 3.35c. on galvanized No. 28 gauge.

Ferro-Manganese.—There is no change in the market, 80% domestic still being quoted at $49@$50 for small lots, and $48 can be done for large quantities.

BY TELEGRAPH.

Pittsburg, Aug. 23.—The Steel Corporation is likely to close to-morrow for 75,000 tons of bessemer pig, at $14.50, Valley furnaces, for September and October. The market is very strong.

Cartagena, Spain. Aug 5.

Iron and Manganiferous Ores.—Messrs. Barrington & Holt report that the shipments for the week were two cargoes, 6,950 tons manganiferous ore, and one cargo 2,750 tons dry ore, to Rotterdam; three cargoes, 12,150 tons manganiferous ore, to Great Britain. Demand continues good.

Quotations are unchanged: Ordinary 50% ore is 6s. 4d.@6s. 7d.; special low phosphorus, 6s. 10d.@7s. 6d.; specular ore, 58%, 9s. 6d.; S. P. Campanil, 9s. All prices are f. o. b. shipping port. Manganiferous ores, same terms, are higher, and range from 10s. for 35% iron and 12% manganese, up to 16s. for 20% iron and 20% manganese.

London. Aug. 12.

Exports of iron and steel and of manufactures thereof, including machinery, are valued as below by the Board of Trade returns for the seven months ending July 31:

	1904.	1905	Changes.
Iron and steel	£16,154,705	£17,843,803	I. £1,689,098
Machinery	12,131,582	13,119,858	I. 988,276
New ships	2,565 623	2,381,459	D. 184,164
Total	£30,851,910	£33,345,120	I. £2,493,210

Exports of mining machinery, included above, were valued at £528,536 in 1904 and £486,371 in 1905; a decrease of £42,165. The more important items this year were £152,269 to South Africa, a decrease of £82,217; and £64,908 to Australia and New Zealand, an increase of £1,463 only.

The leading items of the iron and steel exports for the seven months were as follows, in long tons:

	1904.	1905.	Changes.
Pig iron	492,760	559,093	I. 66,333
Wrought iron	99,400	102,860	I. 3,460
Sheets	224,695	231,091	I. 6,396
Plates	87 176	110,266	I. 23,090
Rails	305 584	320,451	I. 14,867
Steel ingots, etc	67,466	85,500	I. 18,034
Tin plates	197,127	219,686	I. 22,559
All other kinds	413,966	473,029	I. 59,063

There were increases in all items. The total increase in quantities was 213,802 tons, or 11.3%. The shipments of pig iron to the United States increased from 33,861 tons in 1904 to 107,864 tons in 1905. Those of tin-plates to the United States showed a small decrease, from 41,878 tons in 1904 to 40,075 tons this year.

Imports of iron and steel into Great Britain for the seven months ending July 31 were valued at £4,808,760 in 1904, and £4,629,551 in 1905; a decrease of £179,209. Imports of machinery were valued at £2,609,115 in 1904, and £2,824,891 in 1905; an increase of £215,776. The leading items of these imports were as follows, in long tons:

	1904.	1905.	Changes.
Pig iron	78,733	66,893	D. 11,840
Wrought iron	62,947	49,244	D. 13,703
Steel ingots, etc	3'4 616	319,445	D. 5,171
Structural steel	76,086	64,613	D. 11,473
All other kinds	228,368	227,026	D. 1,342

Here a decrease is shown in all items. The total decrease in quantities was 43,529 tons, or 5.6%. Imports of iron ore were: Manganiferous, 151,061; other, 4,019,764; total, 4,170,825 tons, an increase of 609,355 tons, or 17.1%, over 1904. Of the imports this year, 3,269,549 tons were from Spain.

Heavy Chemicals and Minerals.

NEW YORK, Aug. 23.

Prime sulphur (both Louisiana and Sicilian) is quoted in New York, Boston and Portland at $19.50; in Philadelphia and Baltimore at $20. Pyrite continues unchanged at 10@11c. per unit of sulphur for lump ore, with 25c. additional for breaking to furnace size; 9.5@10c. for fines f.o.b. Atlantic ports. Domestic pyrite sells at 11c. per unit for furnace size, and 10c. for fines f.o.b. shipping point. Market even, with no stocks accumulated.

PRICES.

Acids.	
Boric, crystals	per lb. .10
powdered	" .10½
Carbonic, liquid	" .12½
Hydrofluoric, 30%	" .03
48%	" .05
60%	" .11
Nitric acid, 36°, 100 lb	$4.75
38°, 100 lb	5.25
40°, 100 lb	5.50
42°, 100 lb	5.75
Oxalic acid, com'l, 100 lb	$5 00@ 5 25
Sulphuric acid, 50°, bulk, ton	13.50@14 50
60°, 100 lb. in carboys	1.05
60°, bulk, ton	18 00@20.00
66°, 100 lb. in carboys	1.20
66°, bulk ton	21.00@23.00
Blue Stone (Copper Sulphate), car-load lots, per 100 lb	4.90
Nitrate of Soda, 100 lb	2.22½@2.17½
Sulphate of Ammonia, per 100 lb	3.10@ 3.15

Phosphates.	F. o. b.	C. I. F. Gt. Britain or Europe.
*Fla., hard rock	$7.25@7.50	$10.67@11.85
land pebble	3.75@4.00	7.70@ 8.40
†Tenn., 78@80%	4.35@4.40	10.27@10.67
78%	3.75@4.00	.....
75%	3.40@3.50	.....
68@72%	3.00@3.25	.....
‡So. Car. land rock	3.75@4.00	.....
river rock	3.50@3.75	6.33@ 6.61
Algerian, 63@70%	.....	7.04@ 7.71
58@63%	.....	6.15@ 6.60
Tunis (Gafsa)	.....	6.00@ 6.60
Christmas Isle	.....	13.28@14.11
Ocean Isle	.....	13.60@14.45
Somme, Fr	.....	11.39

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

British Chemical Trade.—Exports of chemicals from Great Britain for the seven months ending July 31 are reported as follows, in cwt. of 112 lb.:

	1904.	1905.	Changes.
Copper sulphate	64,088	52,585	D. 11,503
Sulphuric acid	75,951	46,243	D. 29,708
Muriate of ammonia	43,768	50,523	I 6,755
Bleaching materials	457,140	510,930	I. 53,790
Soda ash	750,384	837,992	I. 87,608
Bicarb. soda	174,239	256,232	I. 81,993
Caustic soda	743,899	835,691	I. 91,792
Soda crystals	109 544	112,089	I. 2,545
Soda sulphate	521,866	352,647	D. 169,2 9

With the exception of soda sulphate, or salt cake, the heavy chemicals show substantial increases this year. There was, however, a decrease in exports of copper sulphate. There was also a considerable decrease in sulphuric acid.

Imports of chemicals into Great Britain for the seven months ending July 31 were as follows, in cwts.:

	1904.	1905.	Changes.
Borax and borates	211,262	139,689	D. 71,573
Potash nitrate	150.365	106,776	D. 43,589
Soda compound	176,985	224,820	I. 47,835
Bleach	135, 50	127,345	D. 7,805

Imports of sulphur were 11,952 tons in 1904, and 12,393 tons in 1905; an increase

of 441 tons. Imports of iron and copper pyrites, invoiced chiefly for their sulphur value, were 455,594 tons in 1904, and 421,349 tons in 1905; a decrease of 34,245 tons. Imports of phosphate rock were 264,828 tons in 1904, and 228,015 tons in 1905: a decrease of 36,813 tons. Imports of nitrate of soda were 62,789 tons, a decrease of 11,484 tons from last year.

Metal Market.

New York, Aug. 16

Gold and Silver Exports and Imports.

At all United States Ports in July and Year.

Metal.	July.		Year.	
G'ld	1904.	1905.	1904.	1905.
Exp	$1,083,249	$1,155,105	$69,[illegible]642	$40,986,695
Imp	8,925,418	4,942,949	56,[illegible]144	21,553,402
Exc	I. $7,842,169	I. $3,788,844	E.$12,843,498	E$19,433,293
Silv.				
Exp	4,534,514	4,281,284	38,902,213	29,362,550
Imp	1,381,017	2,947,873	15,156,617	18,121,296
Exc	E $3,153,497	E. $1,333,411	E.$15,745,596	$11,241,254

These exports and imports cover the totals at all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, N.Y.

For the week ending August 19, and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$.....	$55,244	$850,608	$45,961
1905	37,929,843	1,027,173	20,989,569	2,383,349
1904	69,795,579	3,735,437	25,726,077	605,963
1903	2,162,749	3,635,600	12,927,273	1,659,244

No gold was exported for the week; the silver exports were to Great Britain and France. Imports for the week, both gold and silver, were from the West Indies and South America.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars	$0.46½	$0.48½
Peruvian soles and Chilean pesos	.42½	.45
Victoria sovereigns	4.86	4.87½
Twenty francs	3.87	3.90
Spanish 25 pesetas	4.78	4.82

Exports of merchandise from the United States in July are valued by the Bureau of Statistics of the Department of Commerce and Industry at $107,934,424. This is $13,219,062 less than in June, but $22,710,945 more than in July, 1905. For the seven months ending July 31 the statement is as follows:

	1904.	1905.
Exports	$758,949,576	$848,903,447
Imports	579 531.496	673.798,148
Excess, exports	$179,418,080	$175,105 299
Add excess of exp., silver		11,241,254
" " " " gold		19,433,293
Total export balance		$205,779,846

The gold and silver movement in detail will be found in the table at the head of this column.

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Aug. 19 gives the following totals, comparison being made with the corresponding week of 1904:

	1904.	1905.
Loans and discounts	$1,093,174,400	$1,146,101,500
Deposits	1,209,570,500	1,188,551,300
Circulation	37,614,900	51,592,100
Specie	279.179,700	221,194,800
Legal tenders	81,826 000	85,298,700
Total reserve	$361,005,700	$306,493,500
Legal requirements	302,392,625	297,137,825
Balance surplus	$58,613,075	$9,355,675

Changes for the week this year were increases of $6,210,100 in loans, $1,892,100 in deposits and $1,124,600 in circulation; decreases of $196,200 in specie, $2,891,900 in legal tenders and $3,491,125 in surplus reserve.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars:

	Gold.	Silver.
New York Associated	$221,194.800	.....
England	182,896,515	.....
France	590,151,630	$218,561,040
Germany	180,655,000	60,215,000
Spain	74,505,000	111,595,000
Netherland-	32,562,000	30,960,000
Belgium	15,750,000	7,875,000
Italy	122,605,000	16,533,500
Russia	565 040,000	29,445,000
Austria	234,120,000	63,445,000

The returns of the Associated Banks of New York are of date Aug. 19, and the others Aug. 17. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York.

Shipments of silver from London to the East for the year up to Aug. 10 are reported by Messrs. Pixley & Abell, as follows:

	1904.	1905.	Changes.
India	£6,575,838	£4.145,141	D. £2,430,699
China	372,722	753,841	I. 381,119
Straits	58,103	2,800	D. 55,303
Totals	£7,006,663	£4,901,782	D. £2,104,881

Imports for the week this year were £35,600 from the West Indies and £147,300 from the United States, a total of £182,900. Exports were £1,100 to Egypt, £4,500 to China and £86,500 to India; £92,100 in all.

Indian exchange has been firm, as the demand for money in India continues good. The Council bills offered in London were all taken at an average of 16.03d. per rupee.

The movement of gold in Great Britain for the seven months ending July 31 was as follows:

	1904.	1905.
Imports	£19,154,463	£21.972,148
Exports	15,693,054	14,374 962
Excess imports	£3,461,411	£7,597,186

The movement of silver in Great Britain for the seven months was as follows:

	1904.	1905.
Exports	£8,248,820	£8,249,355
Imports	7,600,813	7,647,476
Excess, exports	£648,007	£601,879

Changes were slight. Of the silver imported this year £5,515,166, or 66.9% of the total, came from the United States.

The silver market has had a further sharp rise this week, based on short supplies of spot silver in London, combined with heavy buying for Russian account.

SILVER AND STERLING EXCHANGE.

August.	Sterling Exchange.	Silver. New York. Cents.	Silver. London, Pence.	August.	Sterling Exchange.	Silver. New York. Cents.	Silver. London, Pence.
17	4.8665	60⅛	27¾	21	4.86⅝	60⅜	28
18	4.8675	61	28⅛	22	4.86⅛	61⅛	28⅛
19	4.86⅝	60⅜	28	23	4.86⅛	61⅛	28⅛

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, .925 fine

Other Metals.

Daily Prices of Metals in New York.

August.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
17	15⅝ @15⅞	15½ @15¾	69⅜	32⅝	4.60	5.70 @5.75	5.55 @5.60
18	15⅝ @15⅞	15½ @15¾	69⅜	32⅝	4.60	5.70 @5.75	5.55 @5.60
19	15⅝ @15⅞	15⅝ @15⅞	....	32⅝	4.60	5.70 @5.75	5.55 @5.60
20	15⅝ @15⅞	15⅝ @15⅞	69½	32¾	4.60	5.70 @5.75	5.55 @5.60
21	15¾ @16	15¾ @16	69¾	32¾	4.60	5.70 @5.75	5.55 @5.60
22	15⅞ @16	15⅞ @16	70¼	33	4.60	5.70 @5.75	5.55 @5.60

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars.

Copper.—A fair business has again been done. There is a good inquiry for shipment for early deliveries, but it appears that producers generally are well supplied with orders until the end of the year. They are ready, however, to book business for the first quarter of 1906, and it is reported that considerable business has been effected for such delivery.

Prices have again advanced and we quote at the close 15⅞@16c. for both lake, and electrolytic in cakes, wirebars or ingots, and 15⅜@15½c. for casting copper.

The strong statistical position of the market has attracted the speculative element in Europe, and there has been a much more active business in standard during the week than for some time past. The close is higher at £70 5s for spot and £70 for three months.

Refined and manufactured sorts we quote as follows: English tough, £71@£71 10s.; best selected, £73@£73 10s.; strong sheets, £79; India sheets, £75; yellow metal, 6¾d.

Exports of copper from New York for the week ending Aug. 21 were 4,662 long tons. Our special correspondent reports the exports from Baltimore for the week at 1,083 long tons.

Imports of copper and copper material into Great Britain for the seven months ending July 31, with exports of copper, were as follows; the totals giving the equivalents of all material in long tons of fine copper:

	1904.	1905.	Changes.
Copper ores	45,129	55,134	I. 10,005
Matte and precipitate	37,701	38,034	I. 333
Fine copper	51,251	41,526	D. 9,725
Total imports fine copper	74,615	66,056	D. 8,559
Exports	28 392	25,354	D. 3,038
Balance, imports	46,223	40,702	D. 5,521

Of the imports this year, 48 tons of ore, 2,780 tons of matte and 18,149 tons of fine copper were from the United States; against 22 tons of ore, 3,336 tons of matte and 26,091 tons of fine copper last year.

Tin.—It appears that speculative holdings have been marketed and the market has shown a very much firmer tendency during the last few days. The price in London has advanced at the close to £150 17s. 6d. for spot and £150 10s. for three months, while business here has been done at 33c.

Imports of tin into Great Britain for the seven months ending July 31, with re-exports of imported metal, are reported as follows, in long tons:

	1904.	1905.	Changes.
Straits	16,558	17,487	I. 929
Australia	2,366	2 193	D. 173
Other Countries	1.648	1,425	D. 223
Total imports	20,572	21,105	I. 533
Re-exports	15 431	16,201	I. 770
Net imports	5.141	4,904	D. 237

A large part of the re-exports is Straits tin, sent to the United States.

Lead.—A good business is doing at the last quotations: 4.52½c. St. Louis and 4.60c. New York.

The London market is somewhat firmer and it is reported from there that supplies for near-by delivery are very scarce. The close is £14 for Spanish and £14 2s. 6d. for English lead.

Imports and exports of lead in Great Britain for the seven months ending July 31 were as follows, in long tons:

	1904.	1905.	Changes.
United States	20,194	15,724	D. 5,270
Spain	66,812	60,221	D. 6,591
Australia	42.869	44,088	I. 1,219
Germany	10,986	9,553	D. 1,433
Other countries	5,645	1,448	D. 4,197
Total imports	147,306	131,034	D 16,272
Exports	21,450	23,819	I. 2,369
Net imports	125,856	107,215	D.18,641

The lead credited to the United States is chiefly Mexican lead, refined here in bond.

St. Louis Lead Market.—The John Wahl Commission Co. telegraphs us as follows: Lead is steady and fairly active. Ordinary Missouri brands are selling at 4.55c., while 4.60c. is asked for southwest Missouri corroding lead.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Aug. 5, that silver is 14.25 reales per ounce; exchange, 32.24 pesetas to £1. Local price for pig lead is 75 reales per quintal; equal, on current exchange, to £12 12s. 5d. per long ton, f. o. b. Cartagena.

Spelter.—The market has been rather quiet. During the recent activity most of the consumers covered practically their entire wants for some time ahead, and they are now awaiting a decided tendency one way or another before taking hold. On the other hand, smelters are fairly well sold out, so that as a result the market is in a more or less nominal condition, quotations being unchanged at 5.70@5.75c., New York, and 5.55@5.60c., St. Louis.

Reports from abroad indicate a very strong market and a large business at advancing quotations, the close being given as £24 15s. for good ordinary brands, and £25 for specials.

Imports and exports of spelter in Great Britain for the seven months ending July 31 are reported as below, in long tons:

	1904.	1905.	Changes
Spelter	50,875	47,787	D. 3,088
Zinc sheets, etc	13,040	11 596	D. 1,444
Total imports	63,915	59,383	D. 4,532
Exports	4,210	4,710	I. 500
Net imports	59,705	54,673	D. 5,032

The imports of zinc ores are not reported.

St. Louis Spelter Market.—The John Wahl Commission Co. telegraphs us as follows: Spelter is slightly easier, but fairly steady. Latest sales here are on a basis of 5.57½@5.60c., East St. Louis.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Aug. 5, that there is no change. Prices are nominally 75 fr. for blende, 35% zinc, and 55 fr. for calamine, 30% zinc. The market is dull.

Antimony.—The market is unchanged, and quotations vary from 13½ to 14½c., depending upon brands and deliveries.

Nickel.—Quotations for large lots, New York or other parallel delivery, are 40@47c. per lb., according to size and condition of order. For small quantities, prices range from 48 up to 60c., also according to size of order and deliveries.

Platinum.—Quotations are firm at $20.50 per oz. Gas-engine sparking points vary from 87c. for "A," to $1.80 for "B."

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 0c.; crucibles and dishes, 85c.; perforated wire, 90c.; and cones $1 per gram.

Quicksilver.—Quicksilver is unchanged; large quantities can be had at $40.50 per flask; small orders are placed at $41@$41.50. San Francisco prices are unchanged, $39 being asked for domestic orders. Export business can be placed at $37.50@$38 per flask. The London price is steady at £7 7s. 6d. per flask, from both first hands and jobbers.

Imports of quicksilver into Great Britain for the seven months ending July 31 were 2,357,886 lb. in 1904, and 2,473,568 lb. in 1905; an increase of 84,318 lb. Re-exports of imported metal were 918,455 lb. in 1904, and 994,525 lb. in 1905; an increase of 76,070 lb. this year.

Minor Metals.—For minor metals and their alloys, wholesale prices are f. o. b. works:

Aluminum.	Per lb.
No. 1, 90% ingots	33@37c.
No. 2, 99% ingots	31@34c.
Rolled Sheets	4c. up.
Aluminum-Bronze	20@23c.
Nickel-alum	33@39c.
Bismuth	$2.10
Cadmium, f. o. b. Hamburg	77c.
Chromium, pure (N. Y.)	80c.
Copper, red oxide	50c.
Ferro-Molybdenum (50%)	95c.
Ferro-Titanium (20@25% N. Y.)	75c.
Ferro-Chrom. (74%)	12½c.
Ferro-Tungsten (37%)	29c.
Magnesium, pure (N. Y.)	$1.60
Manganese (98@99% N. Y.)	75c.
Manganese Cu. (30@70% N. Y.)	40c.
Molybdenum (98@99% N. Y.)	$1.75
Tantalic acid (N. Y.)	50c.
Thallium, f. o. b. Breslau, Germany.	65@70c.
Phosphorus, foreign	45c.
Phosphorus, American	70c.
Tungsten (best), pound lots	90c.

Variations in prices depend chiefly upon the size and conditions of orders.

Missouri Ore Market.

JOPLIN, Aug. 19.

The highest price reported paid for zinc ore was $57 per ton; the assay basis ranging from $48 to $54 per ton of 60% zinc, with the average close to $50, as very little ore sold early in the week was purchased on a basis as high as $54. The purchasing agents announced the reduced price on Thursday, the customary purchasing day for the larger quantities of ore, but many producers held back and would not accept the reduction until, on Friday, they were satisfied that all sellers were being treated alike. The acceptance was made too late in the week to load for shipment all the ore purchased, yet the total showed an increase of 420 tons over the previous week. Sellers generally understand that prices are higher than are warranted, and are not opposed to seeing the price recede to a $45 basis, or the equivalent of a 6c. spelter market in New York; but it is unlikely that a lower price will be accepted without a struggle.

Following are the shipments of zinc and lead from the various camps of the district for the week:

	Zinc, lb.	Lead, lb.	Value.
Joplin	2,978,160	226,150	$87,190
Carterville-Webb City	1,914,450	812,880	72,245
Galena-Empire	1 315,920	115,360	36,360
Duenweg	815,800	33 390	23,025
Oronogo	333,200	14,050	8,415
Aurora	504,800	.....	8 400
Carthage	233,950	.....	6 315
Neck City	231,540	.....	6,250
Granby	346,000	27,000	6,000
Alba	179,560	.....	4,840
Prosperity	102,990	73,450	4 780
Baxter Springs	106,890	65,750	4,580
Sherwood	96,340	5.650	2,770
Wentworth	55,460	.....	1,385
Diamond	43,010	.....	1,075
Reeds	35,640	.....	890
Beef Branch	54.060	5,000	8.0
Sprugeon	51,930	.....	780
Totals	9'399 700	1,379,690	$276,130
32 weeks	314,642,300	38,828,830	8,190,935

Zinc value, the week, $234,740; 33 weeks, $7,756,720
Lead value, the week, $ 41,390; 33 weeks, $1,134,215

The average prices for zinc ore for the week were $49.94; for the year, $44.85 per ton. For lead ore the average was $59.99 per ton for the week, and $58.42 for the year.

Heavy water continues to keep the output low, and it is evident that operators who cannot get in their lower ground are turning their attention to the lead deposits higher up. At least the lead output is showing signs of increasing each week. The demand continues equal to all increases, and prices remain strong at $60 for 80% grades and as hgh as $61.50 for a few bins of choice grades.

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1904.	1905.	Month.	1904.	1905.
Jan.....	33.33	52.00	Jan.....	55.55	61 50
Feb.....	33.63	52.77	Feb.....	56.37	57.62
March.....	35.40	47.40	March	57.20	57.20
April.....	35.75	42.88	April.....	58.00	58.00
May.....	34.87	43.31	May.....	57.77	58.27
June.....	32.93	40.75	June.....	56.60	57.80
July.....	33.37	43.00	July.....	53.00	58.00

Wisconsin Ore Market.

PLATTEVILLE, Aug. 18.

The price of zinc ore took a material jump upward. This was caused by the fact that the Joplin output has been curtailed, as several of the larger producing mines of the Joplin field have been flooded with water. The Enterprise sold ore early in the week at $48.50; a number of the producers are holding for $52. The ore buyers are not paying any attention to the assay basis, but are buying ore at whatever price they can get. The average top price for the month of July, 1905, was $43.25; for the corresponding month last year it averaged $33.50 Lead holds its own at $56@$58 for choice lots.

Mining Stocks.

New York. Aug. 23.

Speculation continues strong, and stock dealings are heavy. A special feature of the present situation is the high price which some of the anthracite coal carriers have reached. Delaware, Lackawanna & Western has sold this week above $447; Delaware & Hudson at $224; Reading at $115. There are rumors of buying to secure control of the anthracite lines—which may be taken for what they are worth.

The coal and industrial stocks were largely dealt in, but were not the most prominent. Amalgamated Copper closed at $85½; United States Steel at $36½ for the common and $104½ for the preferred; Virginia-Carolina Chemical at $33¾. Pittsburg Coal preferred sold at $53.

On the Consolidated Exchange, there were some sales of Cripple Creek stocks, and Brunswick, of California, was in some request, after a long period of quiet.

In the outside market, the only sensation was a sharp rise in British Columbia Copper, which sold up to $9. Other copper stocks were quiet. Gold Hill, which has not been heard of for some time, made an appearance, selling for 62½c. per share.

Boston. Aug. 22.

The Copper Range muddle has gone to the courts, as was expected. For the time-being this affair rather upset bullish enthusiasm, but as no new developments in the controversy are likely for some time, there is an inclination to throw this bugaboo aside as a bear factor in the copper-share market. Attention is being paid to the low-priced shares, sometimes referred to as the "Kindergartens"; those particularly that give some promise of favorable developments from the Kearsarge lode. First in this class is Tecumseh, which has risen $2.50 to $9.50 during the week on extra large dealings. The drill cores satisfy the management that the property contains this lode. Superintendent Edwards, who has been in this city, states that work will be started at once to sink a shaft. The Tecumseh has a large amount of treasury stock with which to carry on this work, and it is said that the management will not dispose of it at under $15 per share. Franklin has also benefited and has been a favorite. It touched $13.87½, and closes at $13.50, against $12 a week back.

As yet, the Kearsarge lode has not been tapped at the Franklin, although searched for.

Rhode Island has been a late feature, from the expectation that the Kearsarge lode may be struck on this property. It lies next to the Tecumseh, and has a comfortable cash surplus. During the week the stock has risen $2.50 to $5.12½. National has also risen $1 to $3.12½. Mohawk took a sudden start today and touched $57.87½. A week back it was $54.50. This property is well thought of, anyway, and has less of the speculative element than the others mentioned. Wyandot is up $1.12½, to $2.37½, in sympathy with the other low-priced shares.

Centennial is being constantly accumulated, and records a $2 advance this week, to $26.25. Allouez closed at $34.25. There has been more or less realizing in this stock, although it has been well taken. Dealings in Copper Range have quieted down, and the stock has steadied around $69, which is a $3 advance for the week. Wolverine is up $5, to $124, on limited dealings.

Old Dominion rose $1.25, to $28.25: Osseola, $2.50, to $100.50; Daly West, $1.25, to $15.25; Tamarack, $5, to $125; and United Copper spurted $2.87½, to $37.87½, reacting to $36. Quincy fell $3.50, to $99.50, but rallied to $106. Massachusetts and Michigan have b en neglected. The former has been selling at from $8.75 to $8, and the latter at from $13.50 to $14. Adventure recovered to $6 on the announcement that the miners' strike had been called off, and Isle Royale spurted $1.50, to $23.50, losing $1 of it. Amalgamated touched $86.25, closing to-night at $85.62½. The Calumet & Hecla Co.'s advent into the Keweenaw county territory was officially announced at the annual meeting last week. The declaration of another $10 dividend was a disappointment in some directions, but this is not reflected in the stock, which is $665, ex-dividend.

Colorado Springs. Aug. 18.

There has been a little activity in the trading in Cripple Creek shares during the past week, and the brokers feel confident that it is the beginning of a good fall market, although thus far prices have not materially changed. Anaconda is now selling at 14c. Elkton remains close to 42c. El Paso sold during the week as high as $1.27½, but closed today at $1.22½. Findley remains in the neighborhood of 71½c. Isabella sold down to 28¾c. on today's market. Portland sold during the week for $2.28@$2.40, and Vindicator sold up to 87¾c. per share.

Salt Lake City. Aug. 19.

While the business conducted on the floor of the Salt Lake Stock & Mining Exchange was better than during the previous week, the market has been dull and some of the stocks that have been most active of late suffered declines. Among these were New York Bonanza, Uncle Sam Consolidated, Silver Shield and Yankee Consolidated. Wabash, of Park City, picked up a little; good reports are coming from the mine, which would indicate that development work is progressing very satisfactorily. The heavy shipment of ore being made by the Columbus Consolidated, of Alta, has created a demand for that stock and it has been a conspicuous figure in the week's trading. West Quincy, of Park City, has been the scene of probably the most important strike of the year in that camp, and there has been considerable call for the stock, but there is none for sale here at the present time. The stock is held largely in Scotland. Daly West sold in limited quantity and at higher figures, on the strength of the July report, which showed that the profits of operation exceeded $50,000. The sales of the week on the Exchange amounted to $33,210 in all.

San Francisco. Aug. 17.

The Comstock shares have been quiet, with business generally on a small scale. Ophir fell below $6.50, and most of the other stocks were weak. Trading in the Tonopah stocks was fairly active only. Oil stocks continue dull.

The sworn returns of the mining companies, as filed in their offices this week, show cash on hand July 1 as below, with all expenses paid, unless otherwise noted: Alpha Consolidated, $554; Alta, $1,098, with bills payable of $2,242; Andes, $87, with indebtedness of $1,000; Belcher, $178; Best & Belcher, $5,002; Bullion, $990; Caledonia, $3,886, with July expenses unpaid; Challenge Consolidated, $2,687; Confidence, $3,600, with July expenses unpaid; Consolidated Imperial, $1,505; Consolidated California & Virginia, $1,875, with $6,000 due bank; Crown Point, $4,581; Challar, $4,532; Exchequer, $2,409; Gould & Curry, $1,052, with bills receivable of $390; Hale & Norcross, $2,453; Julia Consolidated, $280; Justice, $365, with bills payable of $500; Mexican, $8,156; New York Consolidated, $757; Overman, $8,322, with July expenses unpaid; Ophir, $14,489, with four carloads of ore at reduction works; Potosi, $1,929; Savage, $6,639; scorpion, $468; Segregated Belcher, $1,969; Sierra Nevada, $6,932; Silver Hill, $20,153; Standard Consolidated, $31,972, with July expenses and July clean-up to be accounted for; Syndicate, $131; Union Consolidated, $1,149; Utah Consolidated, $1,258. The Ward Shaft Association reports a reserve fund of $35,000 on hand.

The following companies in the above list have assessments in course of collecton: Alpha, Andes, Belcher, Bullion, Caledonia, Consolidated California & Virginia, Julia Consolidated, Scorpion, Segregated Belcher, Sierra Nevada, Union Consolidated.

Dividends.

Company.	Payable.	Rate.	Amount.
†Amalgamated Copper	Aug. 28	$1.25	$1,933,750
American Coal	Sept. 1	1.25	62,500
Am. Smelters Sec., pfd. A	Sept 1	1.50	255 000
Am. Smelters Sec., pfd., B	Sept. 1	1.75	375,000
Calumet & Hecla	Sept. 21	10.00	1,000,000
Federal Mg. & Sm	Sept. 15	2.50	125,000
Federal Mg. & Sm. pfd	Sept. 15	1.75	175,000
Gen. Chemical pfd	Oct. 2	1.50	150,000
Homestake	Aug. 25	0 50	109,200
National Lead, pfd	Sept. 15	1.75	262,500
N. Y. & Hond. Rosario	Aug. 26	0.15	15,000
Parrot, copper	Sept. 12	0.50	114,925
Pressed Steel Car, pfd	Aug. 29	1.75	218,750
Silver Hill	Aug. 21	0.05	
Standard Oil	Sept. 15	6.00	5,820,000
U. S. Cast Iron Pipe & Fdy. pfd.	Sept. 1	1.75	218.750
U. S. Steel, pfd	Aug. 30	1.75	6,304,919

*Monthly. §Bi-monthly. †Quarterly. ‡Semi-Annually.

Assessments.

Company.	Delinq.	Sale.	Amt.
America	Aug. 11	Sept. 15	$0.002
Gould & Curry	Sept. 18	.....	0.10
May Day	Aug. 16	Sept. 7	0 025
Snowflake	Aug. 21	Sept. 6	0.05

LONDON. (*By Cable.**) Aug. 15.

	£	s.	d.
Camp Bird	1	13	9
Consolidated Gold Fields	6	0	7½
De Beers	17	0	0
Dolores	$7.25 @ 8.25		
East Rand	7	6	3
El Oro	1	6	0
Esperanza	2	19	6
Modderfontein	8	12	6
Rand Mines	8	15	0
Rio Tinto	66	17	6
Simmer and Jack	1	11	3
Stratton's Independence	0	9	0
Tomboy	1	7	6

*Furnished by Wm. P. Bonbright & Co., New York.

STOCK QUOTATIONS.

NEW YORK. Week August 22.

Name of Company.	High	Low	Clg.	Sales
*Amalgamated	86⅛	83⅞	85⅛	313,935
Anaconda	117⅝	115½	115½	8,400
Arizona Consolidated	30⅜	30⅛	30⅛	2,100
British Col. Copper	9⅛	7⅞	8⅛	85,500
Federal Min. & Smelt	110	110	110	100
Federal Preferred	94⅞	94	94⅜	3,280
Greene Copper	24⅞	24⅛	24⅜	9,000
Greene Gold	4⅜	4⅛	4	3,400
Mitchell	6⅜	5⅞	6	3,700
Tennessee Copper	34	31	32⅞	2,400
Union Copper	1⅜	1⅛	1⅛	1,300
United Copper	37⅛	35	36	39,900
United Copper, Pref	79⅜	78	78½	550
White Knob				100
White Knob, pfd	1½	1½	1½	100

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	130⅜	127⅞	129⅛	121,475
Am. Smelting & Ref., Pf.	124½	121½	123	5,775
Am. Sm. Securities, Pf B	99	98⅛	99	700
Colorado Fuel & Iron	47⅞	46	46	30,100
National Lead	47⅞	43⅛	43⅞	43,870
National Lead, Pf	105⅛	103	103	150
Pittsburg Coal	14½	14	14	1,100
Pittsburg Coal, Pf	53	52	52	1,200
Republic I. & S.	22⅛	21⅛	21½	20,220
Republic I. & S., Pf	89⅜	86⅞	88⅛	23,150
Tenn. Coal & Iron	91⅞	89⅛	89⅛	38,680
U. S. Red. & Ref., Pf	35⅝	32⅜	34	2,400
U. S. Steel	37⅞	35⅝	36	309,950
U. S. Steel, Pf	105⅝	103¼	104	204,750
Bethlehem Steel	34½	33	33	2,215
Bethlehem Steel, Pf	91½	88⅝	88⅝	1,280
Standard Oil	624	615	617	73

BOSTON.

Allouez	34¾	33½	33¾	7,184
*Amalgamated	86⅜	84	85⅝	14.038
Atlantic	18⅜	17⅞	18	2,815
Bingham	31	30	30	1,515
Boston Consolidated	8⅛	7¾	7¾	2,270
*Calumet & Hecla	675	655	660	110
§Centennial	26¼	24½	25½	3,851
Mercur	.58	.55	.56	1,965
Copper Range	69½	66	68½	13,735
Daly-West	16½	14	15	1,808
Elm River	2¾	2½	2½	270
Franklin	13⅞	12	13½	8,624
Granby	7⅞	7	7	2,822
*Green Con. Copper	25	24¼	24⅜	3,211
Guanajuato	4½	3	4¼	810
Isle Royale	23½	22	22	1,200
‡Mass	8¾	8	8⅜	1,880
Michigan	14½	13¼	13½	2,485
Mohawk	57⅜	54⅜	55¾	3,507
Old Dominion	28¼	27	27	1,695
*Osceola	100½	98	99½	1,065
Parrot	25½	25	25½	305
Phoenix	1⅛	1	1 1/16	610
*Quincy	106	99½	105	490
Rhode Island	5¼	3	4⅝	11,675
Santa Fe	2⅝	2	2	805
Shannon	7½	7	7	2,809
Tamarack	125	121	123	171
Tecumseh	9⅝	7	8¾	24,885
United Copper, com	37⅞	34¾	35½	8,877
United Copper, Pf	78	78	78	200
*United States	33¾	32½	32⅞	8,517
United States Coal & Oil	10¾	10¼	10¼	1,008
*Utah	45¾	45	45⅞	2,708
Victoria	4⅞	3¾	4⅛	1,315
Winona	12½	11½	12	1,160
Wolverine	124	119	124	347

PHILADELPHIA.

Cambria Steel	27⅞	27¼	27¼	2,458
Philadelphia Co	46½	45⅝	45⅝	3,856
Tonopah	14¼	13	13⅜	5,204

PITTSBURG.

Crucible Steel	12⅝	12⅜	12½	1,600
Crucible Steel, Pref	65	64¾	64½	955
O. Tonopah	.34	.33	.33	200
Tonapah Ext	6.30	5.75	5.75	3,675

COLORADO SPRINGS.

Name of Company.	First	High	Low	Clg.
Elkton	41⅛	45	41	42
El Paso	127½	127½	120	120
Independence	15	15	12½	12½
Isabella	29¼	29¼	28⅛	28⅝
Portland	245	245	230	230
Vindicator	88	90	75	80

SAN FRANCISCO.

Best & Belcher	1.20	1.20	1.15	1.15
Bullion	.38	.38	.32	.34
Caledonia	.39	.40	.34	.34
Confidence	.82	.82	.77	.77
Con. Cal. & Va	1.20	1.25	1.15	1.15
Gould &Curry	.14	.14	.11	.11
Hale & Norcross	1.55	1.55	1.35	1.35
Mexican	1.20	1.35	1.20	1.20
Occidental Con	.87	.87	.87	.87
Ophir	6.24	7.00	6.25	6.37½
Savage	.60	.60	.49	.49
Sierra Nevada	.33	.36	.32	.32

*Ex-dividend. †1st Instalment Paid.
‡Assessment Paid. §2d Installment Paid

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January	57.005	60.690	26.423	27.930
February	57.592	61.023	26.665	28.047
March	56.741	58.046	26.164	26.794
April	54.202	56.600	24.974	26.108
May	55.430	57.832	25.578	26.664
June	55.673	58.428	25.644	26.910
July	58.095	58.915	26.760	27.163
August	57.806	.....	26.591	.....
September	57.120	.....	26.349	.....
October	57.923	.....	26.760	.....
November	58.453	.....	26.952	.....
December	60.563	.....	27.930	.....
Year	57.221	.....	26.399	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.			
	1904.	1905.	1904.	1905.	1904.	1905.
Jan.	12.410	15.008	12 553	15.128	57.500	68.262
Feb.	12.063	15.011	12.245	15.136	56.500	67.963
March	12.299	15.125	12.551	15.250	57.321	68.174
April	12.923	14.920	13.120	15.045	58.247	67.017
May	12.758	14.627	13.000	14.820	57.321	64.875
June	12.269	14.673	12.399	14.813	56.398	65.881
July	12.380	14.888	12.505	15.005	57.256	66.887
Aug.	12.343	.....	12.468	.....	56.952	.....
Sept.	12.495	.....	12.620	.....	57.645	
Oct.	12.993	.....	13.118	.....	60.012	.....
Nov.	14.284	.....	14.456	.....	65.085	.....
Dec.	14.661	.....	14.849	.....	66.384	.....
Year.	12.823	.....	12.990	.....	58.587	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars; cathodes are usually 0.25c lower. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	28.845	29.325	July	26.573	31 760
Feb.	28.087	29.262	August	27.012	.....
Mar.	28.317	29.523	Sept.	27.780	.....
April	28.132	30.525	Oct	28.596	.....
May	27.718	30.049	Nov.	29.185	.....
June	26.325	30.329	Dec.	29.286	.....
			Av., year.	27.986	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	4.347	4.552	July	4.192	4.524
Feb.	4.375	4.450	Aug.	4.111	.....
Mar.	4.475	4.470	Sept.	4.200	.....
April	4.475	4.500	Oct	4.200	.....
May	4.423	4.500	Nov.	4.200	.....
June	4.496	4.500	Dec.	4.600	.....
			Av., year.	4.309	.....

Prices are in cents per pound.

SPELTER.

Month.	New York.		St. Louis.		L'nd'n
	1904.	1905.	1904.	1905.	1905.
January	4.863	6.190	4.673	6.032	25.063
February	4.916	6.139	4.717	5.989	24.594
March	5.057	6.067	4.841	5.917	23.825
April	5.219	5.817	5.038	5.667	23.813
May	5.031	5.434	4.853	5.284	23.594
June	4.760	5.190	4.596	5.040	23.875
July	4.873	5.396	4.723	5.247	23.938
August	4.866	.....	4.716	.....	.....
September	5.046	.....	4.896	.....	.....
October	5.181	.....	5.033	.....	.....
November	5.513	.....	5.363	.....	.....
December	5.872	.....	5.720	.....	.....
Year	5.100	.....	4.931	.....	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.